DOCUMENT RESUME

ED 124 408 95 SE 020 507

AUTHOR	Pengra, H. C.
TITLE	Job Competency Needs of Sanitarian Aides.
INSTITUTION	Iowa State Dept. of Public Instruction, Des Moines.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.
REPORT NO	CPL-90-576
PUB DATE	75
NOTE	122p.; Occasional marginal legibility in appendices
AVAILABLE FROM	State Director, Career Education Division, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319 (free while supply lasts)
EDRS PRICE	MF-$0.83 HC-$6.01 Plus Postage.
DESCRIPTORS	Environmental Education; *Environmental Technicians; Health Education; Higher Education; *Job Skills; *Public Health; Reference Books; *Sanitation; *Vocational Education

ABSTRACT

In the past decade, the job of sanitarian aide has come into existence. As with any new field, job descriptions vary greatly from employer to employer. The aim of this publication is to provide base data of benefit to persons developing curricula for sanitarian aide training programs; to employers; and sanitarian aides developing job responsibilities and duties. This publication is the result of a research study to determine this information. A questionnaire concerning competency need factors for sanitarian aides, sent out to Iowa and Nebraska personnel, provides the data for the list of standards presented in the book. Two appendices at the end of the book include a sample two-year curriculum for sanitarian aides and the survey instrument. (Author/MA)

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Job Competency Needs of

SANITARIAN AIDES

Developed by Community Services Division,
Iowa Western Community College, Council Bluffs,
in cooperation with
The Iowa Department of Public Instruction
1975

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PREFACE

Job Competency Needs of Sanitarian Aides was a research study undertaken to provide base data of benefit to persons developing curricula for sanitarian aide training programs. Employers and sanitarian aides also will be provided data upon which to develop job responsibilities and duties.

Limited copies of this publication are available without charge from the State Director, Career Education Division, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

The activity which is the subject of this report was supported in whole or in part by the U. S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education, and no official endorsement by the U. S. Office of Education should be inferred.

ACKNOWLEDGEMENTS

The investigator wishes to acknowledge the assistance of Dr. Richard Hawkes of the University of Northern Iowa and Mr. James Hamilton, Dean of Community Services, Iowa Western Community College, for their time, efforts, and suggestions which have contributed greatly to this writing. Also, acknowledgment is made of the efforts of Dr. Wayne Rudolph, administrator of the project, in guiding and editing the work which has been the equivalent of a course in research writing.

Research Assistant Alan Wagner has been a great help and inspiration. His help has been invaluable and is deeply appreciated.

Lastly, I must acknowledge the efforts of my wife, Everall, for her assistance in tabulating and in typing the rough drafts and for her patience in the lost evenings and weekends which I invested in this work rather than in our home and family.

H. C. Pengra
Principal Investigator

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CHAPTER I

PRESENTATION OF THE PROBLEM

Introduction

A study of the history of public health and environmental work in the United States reveals the fact that a position entitled Sanitarian Aide has emerged primarily within the past decade. Prior to the 1960's almost no reference is made in the technical journals relative to this position. In the professional writings of the later 1960's, however, frequent reference is made to a position variously entitled as Sanitary Assistant, Environmentalist I, Deputy Inspector, and Sanitary Officer to name a few.

Since the position, Sanitarian Aide, is relatively new in this country it is not surprising that the job descriptions and duties vary widely among employers and supervisors. Because of the wide diversity of the descriptions of this position, the comprehensive job description found in the Dictionary of Occupational Titles was used to form the basis for this study.

The job description found in the Dictionary of Occupational Titles is as follows:

> SANITARY INSPECTOR (gov. ser.) 168.287
> sanitarian aid. Investigates public and private establishments, such as restaurants, hotels, homes, cafeterias and places of public gatherings, to determine compliance with or violation of public sanitation laws and regulations; makes unannounced visits to various institutions to insure regulations are being followed. Inspects eating and drinking establishments for cleanliness, and determines if vermine or other pests, such as rats or mice, are present. Takes samples of such materials as water, food, and air and performs or orders chemical, physical or biological tests to determine contamination.

> Issues violation notices and corrective orders when violations are found. Assists SANITARIAN (profess and kin) in conducting phases of environmental health programs.[1]

This, then, is the job description of the sanitarian aide used in this study. While many other titles could have been used, the writer felt these other titles usually indicated a too narrow degree of specialization. The title, Sanitarian Aide, utilized in this paper indicates a position which requires the aide to have some knowledge and ability in those areas of environmental and public health work in which a professional sanitarian is required to have expertise. While the professional sanitarian invests at least four years in formal educational preparation, the aide or para-professional, with less than a baccalaureate degree, is usually employed at an entry level position.

Statement of the Study

At the present time there appears to be widespread diversity concerning the duties and responsibilities for the position of sanitarian aide. Since there apparently exists almost no research relative to the duties and responsibilities of the sanitarian aide, curriculum writers have little evidence other than their own experience upon which to base their curriculum decisions. With a base of research data, more effective learning experiences can be developed for the training of sanitarian aides by curriculum designers. The lack of research has also created difficulty for both employers and sanitarian aides relative to the responsibilities and duties of this position. The lack of precision in the job description and duties of the sanitarian aide has contributed to either the under or over-utilization of the worker employed in this position.

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[1] U.S., Department of Labor, Dictionary of Occupational Titles, Third Edition (Washington: Government Printing Office, 1965), I, p. 626.

The purpose of the study is to identify job competency needs of Sanitarian Aides in the field of environmental sanitation and to assemble the data acquired in matrix form that educators may use for curriculum development.

This study provides curriculum writers with additional criteria upon which to base effective education and training programs for sanitarian aides. Employers and sanitarian aides will also be provided with basic data upon which to develop job responsibilities.

Definition of Terms

Sanitarian Aide: A person with a high school or equivalent education trained in environmental control techniques to work as a para-professional under the supervision of a professional sanitarian.

Professional Sanitarian: A person with a minimum of a Bachelor's Degree in natural sciences and registered with the National Association of Environmental Sanitarians and/or another equal certifying agency in the field of environmental control.

Limitations of the Study

The survey population of this study is limited to those persons in supervisory control of the position, Sanitarian Aide, in the states of Iowa and Nebraska. The determination was made that the size of the population to be surveyed in these two states would be sufficient to give adequate data.

The survey is limited to local and county boards of health and their environmental sanitation supervisory personnel. The respondent for the local and county boards of health in each case was the chairman or vice-chairman. An inquiry of the Nebraska State Health Department indicated there was no counterpart of these boards in Nebraska. Therefore, the survey population was limited to only the environmental sanitation supervisory personnel in the State of Nebraska.

The method used to gather the necessary data presented another limitation. Because of the limits of time, financial resources, and physical endurance, the writer found it necessary to gather the required data through the use of a mailed questionnaire.

CHAPTER II

SURVEY OF LITERATURE

The survey of literature has covered the publications of the health and environment-oriented organizations of the United States of America. The technical journals and publications of the organizations referred to above were located in the public libraries of Council Bluffs, Iowa; Omaha, Nebraska; and the college libraries of Iowa Western Community College and the University of Nebraska at Omaha. No references were located which met the criteria set forth in the definition in Chapter I.

The American Journal of Public Health reports on the utilization of health aides.[1] The health aides referred to in this article are unemployed, untrained persons who could be utilized to some extent in official health agency settings. The article designs a "conceptual framework" in which the health aide might be effectively utilized. An earlier issue of the same publication refers to new health careers.[2] This article proposes to utilize otherwise unemployed and/or socially depressed people who need the social status of a career rather than an entry level job with no chance for personal satisfaction or improvement.

Several other articles were located which discussed similar concepts. However, nothing was located relevant to job competency needs of sanitarian aides.

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[1]Lawrence B. Callan, "A Conceptual Framework for Consideration in the Utilization of Health Aides", American Journal of Public Health, 61:5:979-987, 1971.

[2]Anthony Lenzer, "New Health Careers for the Poor", American Journal of Public Health, 60:1:45-50, 1970.

The National Association of Environmental Sanitarians furnished a proposed two-year preparatory curriculum.[3] This curriculum has in it an introduction which states in part:

> The conference was attended by twenty-one people from academic institutions with two-year or four-year programs in environmental health, from agencies that employ environmental health technicians and sanitarians, and by persons experienced or knowledgeable in training and curriculum development. This conference was held because of the manpower needs in the field of environmental health. There is an increasing utilization of and need for two-year trained environmental control, and by industry. The community colleges developing programs for training environmental technicians need curriculum guidelines. The prediction for future manpower needs, and programs to train people to meet these needs, make the development of curriculum guidelines even more critical. (See Appendix A).

Several branches of the Department of Health, Education, and Welfare were contacted and the writer has had extensive correspondence with several schools of public health. While this phase of the study has been extremely time-consuming, the resultant correspondence is quoted since it sheds light as to the present data available related to the position of sanitarian aide.

Dr. C. H. Lawrence, Ph.D., Associate Professor of the Department of Environmental Health, University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma informed us:

> Your letter of January 15, to the Dean of the College of Health has been forwarded to the Department of Environmental Health for action. Unfortunately, we know of no literature review on the subject of "Competency Needs of Sanitarian Aides". We do, however, suggest that you contact Dr. Robert V. Garner, Oklahoma Environmental Information and Media Center, East Central State College, Ada, Oklahoma 74820.

As suggested, correspondence with Dr. Robert Garner was initiated, and he states:

---

[3] Two Year Curriculum Environmental Health Technician. A Conference Report, Atlanta, Georgia. National Environmental Health Association & U.S. Public Health Service, May 27, 1970.

> Our personnel in the School of Environmental Science has been interested in the program you mentioned also. However, in their search for this same information very little has been found. In most of what has been uncovered has been just personal conversations with employed Sanitarians. From their interviews it appears that the working interest of being employed determines the competency of any Aides that he might employ.

Dr. J. W. Mason, Acting Chairman of the Department of Environmental Health Sciences of Tulane University, School of Public Health and Tropical Medicine at New Orleans, Louisiana states:

> To my knowledge, the Florida System of community colleges offers a program in air and water pollution technology at the Brevard County Community College - which is (or was) operated with the help of the Department of Environmental Engineering at the University of Florida in Gainesville, Florida. Dr. Robert Sholtes was involved in the early phases and, I assume they considered "competency needs" in designing their curricula. Bob has since left the University, however, they should be able to provide you with a forwarding address.
>
> Tulane has not been engaged in the area, thus we have no first hand information to offer.

A letter to Dr. Robert Sholtes was apparently not forwarded to his present address. Therefore, follow-up was incomplete on this suggestion.

In response to continued inquiry of the School of Public Health of the University of Texas at Houston, Dean Reuel Stallones responded:

> In response to your request for literature on the competency needs of sanitarian aides, I am sorry but I do not know of anything. I am referring your letter to Dr. Hemphill on our staff for direct reply to you, and I also suggest that you ask the people at the University of California School of Public Health at Berkeley.

Dr. F. M. Hemphill, also of the University of Texas at Houston, emphasizes the lack of research on Sanitarian Aides in his letter, a part of which is quoted here.

> Dr. Reuel A. Stallones has requested that I respond to your inquiry about the "competency needs" of sanitarian aides. I know of no literature which makes reference

to "sanitarian aides" per se. Enclosed is all the information I could find which is in some way associated with related occupations.

Professor Walter Jopke, Division of Environmental Health and Safety, University Health Service of the University of Minnesota, answered the writer's inquiry as follows:

> Your letter regarding the competency needs of sanitarian aides has been forwarded to me for reply. Since we do not, at the University, offer any particular curriculum relating to sanitarian aides, it was necessary for me to do a little inquiring with other colleges in this area.
>
> The first suggestion I would make is that you write to the National Environmental Health Association, 1600 Pennsylvania Street, Denver, Colorado 80203, and request a copy of their "Recommended Qualifications and Employment Standards for Environmental Health Personnel." This will give some background information and help you evaluate some of the environmental health needs for your study.
>
> Last week the faculty of the local Anoka County College and Hennepin Junior College met with us and representatives from industry to determine the interest for sanitarian aides or trainees. It is our feeling that, unless it's a large health agency whereby these aides can be used for sampling, nuisances and so forth, there appears to be no need for them. However, it was interesting to note the interests of industry, (represented by Northern States Power Company, General Mills, Honeywell, Pollution Curbs and the State Pollution Control Agency) apparently are different. Each industry had their own course requirements depending upon, for instance, a sampling program of air, water, waste, computer needs, etc., and it was difficult to put all of these courses into a two-year college level course. In any case, there is some interest from industry for this type of personnel.
>
> Some of the faculty of the above-named colleges will be proceeding with this program and we should have further information from them.
>
> Sorry that I do not have any more information. However, I hope that this information will be of some help.

Professor Cornelius W. Kruse of John Hopkins University, School of Hygiene and Public Health, states in part:

> Unfortunately we do not have any literature on this subject but suggest you contact Dr. R. W. Jones, Chief, Foreign Students

Education Branch, Bureau of Health Profession Education and Manpower Training, 330 C Street, S.W., Washington D.C. 20201. He made an Environmental Health Manpower Study with special emphasis on "competency needs" of all kinds of personnel.

Dr. Jones was contacted by both correspondence and telephone.[4] He was interested enough in this project to photocopy a large portion of his doctoral dissertation. This was thoroughly reviewed. This excellent work describes the educational background of the public health employees in the State of Maryland and it projects probable future needs in the same areas. Dr. Jones is one of the most noted authorities on public health training in this country and his work reveals the need for competency studies. He reports that in Maryland 20.6% of the sanitarians are without college degrees while 35.1% of the aides have completed one to four years of college work.

---

[4] Robert W. Jones III, "Maryland Environmental Health Manpower Projection 1980" (unpublished Doctoral dissertation, John Hopkins University, 1969), pp. 92-97.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this chapter is to present the methods and procedures employed in this study to amass, order, and analyze the data of the respondents selected to participate in the study.

The Population of the Study

The total population selected to participate in phase one of the study was 245. The total population for phase two of the study was 250. The reason for the change in the survey population was due to the personnel changes in the various health departments included in the survey.

Table I displays the population numbers mailed and numbers returned. The population is divided into the five divisions used throughout the study.

TABLE I

NUMBER OF SURVEY INSTRUMENTS MAILED AND RETURNED
CATEGORIZED BY QUESTIONNAIRE AND SURVEY POPULATION SUBDIVISION

POPULATION DIVISION	PHASE I QUESTIONNAIRE I		PHASE II QUESTIONNAIRE II		QUESTIONNAIRE III	
	SENT	RETURNED	SENT	RETURNED	SENT	RETURNED
Iowa Board	110	52	109	50	109	45
Iowa Administrators	25	11	24	15	24	15
Iowa Sanitarians	48	52	54	35	54	39
Nebr. Administrators	19	19	28	12	28	13
Nebr. Sanitarians	43	29	35	20	35	10
TOTAL	245	163	250	132	250	122
% Returned	66.53		52.80		48.80	
Returned Unusable		22		19		17
Grand Total Returned		185		151		139
% Accounted for	75.51		60.40		55.60	

All levels of government were represented in the survey population since the sanitarian aide would be an employee of a local, county, state, or Federal agency. The board of health chairmen were requested to complete the survey instrument to provide an opinion of major employers of what job competency needs are required.

The administrators and sanitarians within the survey population were requested to complete the questionnaire to provide their respective opinions relative to the job competency requirements of the sanitarian aide. This broad spectrum of opinions of supervisors, directors or administrators, and employers or board members provides a better foundation for the conclusions drawn in Chapter V than could be drawn from a narrow survey population.

The administrators and sanitarians of Nebraska and Iowa were surveyed to give a comparision of their opinions as to job requirements. Iowa does not have a professional sanitarian registration law. Nebraska has had such a law in effect for several years. Consequently all administrators and sanitarians surveyed in Nebraska are registered professional sanitarians while many in Iowa are not. It was deemed desirable to compare the competencies expected of the aides in Iowa and Nebraska since the potential supervisors in one state must meet registration standards which are not required in the other.

Development of the Survey Instrument

Early in the study it became evident that the potential knowledges and abilities of the Sanitarian Aide were numerous and varied. A questionnaire which would thoroughly survey all the potential skills required of the sanitarian aide would be so cumbersome and unwieldly that response from the population would be discouraged rather than enhanced. It was decided to divide the research into smaller modules to encourage the respondents to

complete the survey instruments. The potential specialty work areas were grouped into five modules. The first questionnaire was based upon the first module. The second and third questionnaires were of the same format except that they were longer and covered two modules each.

The first survey instrument had 65 questions. The second survey instrument consisted of 124 questions and the third had 120. This totals 309 questions asked each of the respondents.

The respondent was provided three possible responses of varying degrees of importance to each question. These possible responses were: A, Very Necessary; B, Desirable; C, Not applicable. It should be noted this survey instrument was not designed to gather data on the frequency of use of these competencies but upon the necessity of having them. Some of the competencies listed in the questionnaire are used seldomly. For example, only twice in 20 years has the writer had to do the epidemiology of a possible rabies outbreak in humans. Knowledge of how to handle these potentially critical situations was invaluable.

The first ten questions were considered personal attributes of a sanitarian aide. The other 299 questions of the three questionnaires were taken from codes, ordinances, and regulations used in the work areas of the sanitarian aide. The 299 questions were divided into twenty subject areas in which the sanitarian aide might be expected to work. The subject areas were separated and displayed on the questionnaires. The first questionnaire contained 66 questions. The first ten mentioned above, the remaining 56 are on the subjects of private water supplies, private sewage systems, nuisance complaints, and eating and drinking establishments.

The second survey instrument contained 124 questions on the subjects of air pollution, solid waste control, industrial noise, water pollution control,

transient lodging facilities, communicable disease control, swimming pool inspection and milk inspection. The third and last survey instrument contained 120 questions on the subject of housing inspection, rodent control, occupational safety inspection, radiological inspection, industrial sanitation, insect control, animal control and institutional inspection.

The survey instruments were field tested. The field test was conducted by submitting the questionnaire to two board members, two administrators, and two sanitarians. Each item was checked for appropriateness of wording, clarity of item construction, and comprehensiveness of possible responses. Suggestions received from the field trial were incorporated into the final survey instrument. Copies of the final survey instruments appear in Appendix C.

Collection of the Data

The questionnaires were printed on the inside of a double sheet of paper with a cover letter printed on the front. The name and address of each member of the survey population was typed onto the cover letter. This provided a positive identification of each respondent. A self-addressed stamped envelope was included and the packet of materials was mailed.

Treatment of the Data

Each questionnaire, as it was received by the investigator, was sorted and placed in the proper sub-group category. The responses contained in each questionnaire were recorded on specially-constructed worksheets.

Accumulated totals and percentages of the responses were computed for each item of the questionnaire.

To enable the investigator to analyze the data, a numerical value was assigned to each of the three possible responses. Response A, Very necessary,

was assigned the numerical value 3; response B, Desirable, was assigned 2; and response C, Not Applicable, was assigned the value of 1. The Competency Needs Factor (CNF) was computed for each item of the questionnaire for each sub-group of the population surveyed. For example, on item #1, nine Iowa health department administrators indicated "A", two indicated "B", none indicated "C". This gave a weighted score of 31 from 11 respondents. The CNF for item #1 for this sub-group was computed at 2.82. The highest CNF possible in this study is 3.00 and the lowest CNF is 1.00. From the worksheets, the CNF was calculated for each of the 309 items for the five sub-populations of the survey.

CHAPTER IV

FINDINGS OF THE STUDY

This chapter will provide the reader with a display of the assembled data of the study. The assembled data are provided by total population, by the individual Iowa sub-groups, and by the individual Nebraska sub-groups. In addition, a table of comparison between the Iowa and Nebraska populations is provided for each item of the survey instrument.

The competency need factor of each item is listed in descending order in the left hand column in all but the final table. In these same tables the second and third columns provide the survey item number and item description respectively.

The tables include the entire responses. In the final table the items are listed in ascending numerical order in the first column to the left with the CNF in the second column and the description to the right. This final table was included because Nebraska has had a professional registration law for public health sanitarians in effect for several years. Iowa has no such law. The comparisons found in the displayed material in Table VIII should be of interest to many in Environmental and Public Health work.

The total survey population selected to participate in this study are the Boards of Health Chairmen of Iowa and the Health Department Administrators and practicing Sanitarians of Iowa and Nebraska. This divided the survey population into five sub-groups as indicated in Table I.

Since the subject to be researched is so extensive the determination was made to use three questionnaires. These were mailed several weeks apart to the total survey population. Due to the time span involved the survey population varied between 245 and 250 individuals. The percentage of returns predictably went down on each questionnaire mailing. For the first survey 75.51% were returned. On the second survey 60.40% were returned and on the third survey 55.60% were accounted for.

There were unusable returns in each survey. These were due to people leaving the specified geographical area or leaving the profession for retirement or other endeavors. Several were returned as undeliverable. Therefore, in Table I the "% Reported" and the "% Accounted for" are not equal.

TABLE II

Table II displays the data amassed from the total returned questionnaires of 417. The respondents indicated their opinions as to the necessity of a sanitarian aide to attain each listed competency. These CNF's are arranged in descending order of importance.

TABLE II

COMPETENCY NEED FACTORS IN DECENDING ORDER
OF IMPORTANCE BY THE TOTAL SURVEY POPULATION

CNF	Item No	Item Description
2.87	43	Difference between sanitary & unsanitary conditions
2.82	1	Knowledge of codes
2.81	10	Cooperate with other departments
2.80	2	Public relations
	5	Dependable work habits
	41	Recognize public health nuisance
2.78	27	Public Health hazards of contaminated system
	116	Take legal water samples
2.77	14	Recognize need of disinfection
2.76	65	Recognize good personal hygiene
2.75	34	Recognize acceptable sewage installation
	64	Recognize safe and unsafe food handling procedures
	138	Recognize cross connections between water and sewage systems
	191	Recognize acceptable toilet facilities
2.74	33	Inspect existing sewage systems
	128	Sample chlorinated water
	163	Take legal swimming pool water samples
2.73	60	Control pests in food service establishments
2.71	18	Sanitary precautions for each type of well
	23	Routes of contamination in wells
	53	Inspect eating and drinking establishments
2.71	205	Accepted safeguards for various poisons
2.70	24	Sample water supplies
	39	Recognize sewage system failure
	124	Types of chemicals used for emergency chlorination
	210	Recognize rodent harborages
2.69	20	Disinfect a water system
	63	Recognize acceptable refrigeration facilities
	133	Recognize health hazards at summer camps
2.68	3	Write meaningful reports
	17	Recognize cross connections
2.67	171	Run field tests of chlorine and pH
2.66	4	Personal hygiene
	16	Recognize types of wells
	56	Sanitation of multi-use utensils
	57	Recognize single service utensils
	276	Recognize mosquito breeding areas
2.64	7	Methods of gathering and preserving evidence
	54	Recognize cross connections in plumbing
	62	Control of pathogenic organisms in food
	93	Know sanitary landfill standards
	296	Ability to recognize unclean conditions by sight and smell

TABLE II - Continued

CNF	Item No.	Item Description
2.63	125	Ability to define "potable water"
	211	Know standards for storing materials to deter rodents
2.62	193	Ability to recognize acceptable bathing facilities
	267	Know insects of public health importance
2.61	61	Recognize hazardous chemicals and know their uses
	135	Understand vector control in camps
	165	Understand relationship of pH to chlorine
	283	Know proper procedures in a human rabies exposure
2.60	190	Ability to recognize acceptable kitchen facilities
	275	Know mosquito control methods
2.59	15	Run field test for disinfectant residual
	153	Understand pasteurization, sanitation, and sterilization
	293	Know epidemiological procedures for zoonosis
2.58	119	Knowledge of techniques used to treat water
	164	Understand algae control
	273	Know materials in which flies will lay eggs
2.57	52	Ability to run field tests on dishwashing machines and sanitizing solutions
	59	Ability to evaluate cleanliness of vending machines
	87	Know proper compaction and cover procedures
	173	Understand use of chlorine, alum and soda ash
	181	Ability to take legal milk samples
	203	Know rat proofing methods
	269	Know proper use of insecticides
	274	Know sanitary storage methods of insect breeding materials
2.56	194	Understand the definitions in the State Housing Code
	207	Know effective rat proofing methods
2.55	130	Understand and apply standards for semi-public water and sewage systems
	160	Know the meaning of "High-free Residual Chlorine"
2.54	26	Know the procedure to seal an abandoned well
	28	Know and have the ability to apply standards to privies
	42	Ability to assist pet owners in fly, rodent, and odor control
2.53	289	Know how to handle a rabid animal
2.52	22	Ability to inspect and recognize each type of well construction
	96	Knowledge of vector control
	99	Understand community-wide solid waste control methods
	188	Know farm storage milk temperature requirements
2.51	51	Understand the S.N.F. standards relative to food service equipment
	251	Ability to recognize dangerous situations in industrial plants
	252	Know good housekeeping practices.

TABLE II - Continued

CNF	Item No.	Item Description
2.50	29	Ability to accomplish percolation tests
	123	Ability to do a sanitary survey of water supply
	262	Know which state department is responsible in case of an an industrial accident
	287	Ability to cooperate with Humane Society
2.49	146	Know the mode of transmission of vector-borne diseases
	149	Understand dog and cat control ordinances used in human rabies cases
	198	Know plumbing fixtures required in dwellings
	209	Know house mouse control methods
2.48	98	Know refuse control measure at camps and transient lodging facilities
	142	Understand and be able to explain use of pesticides in camps
	225	Know where protective clothing must be worn
	226	Know when safety equipment must be readily available
	277	Understand water ponding control as a mosquito control tool
	285	Know evidence of lack of sanitary manure storage
2.46	186	Know the significance of coliform bacteria in pasteurized milk
	192	Ability to recognize acceptable sleeping facilities
	196	Know the responsibilities of occupants of dwelling
	272	Know intermediate hosts of insects of public health importance
	294	Know modes of transmission for salmonella from pets to human
2.45	8	Knowledge of enforcement procedures
	85	Know how to control blow paper
	200	Know meaning of deteriorated and dilapidated
	256	Ability to work with plant safety office
2.44	172	Know requirements of safety equipment
	208	Know diseases spread by rodents to man
	258	Recognize conditions causing disabilities and accidents
	266	Know major disease spread to man by insect
2.43	195	Know the responsibilities of owners of dwelling
	295	Know the route of infection transmission in nursing homes
2.42	25	Ability to interpret water supply analysis reports
	71	Name five major sources of air pollution
	81	Understand air pollution warnings, alerts, and emergencies
	114	Know the level of decibels that causes some permanent hearing loss
	117	Know the functions of a reservoir
	132	Ability to apply sanitary standards to migratory labor camps
	136	Understand electrical, sewage, and water hookups in public campsites
	152	Understand the difference between aerobic and anaerobic bacteria
	178	Know bacterial and chemical standards for both raw and pasteurized milk
	212	Ability to recognize restricted substances by name

TABLE II - Continued

CNF	Item No.	Item Description
2.42 (Cont'd)	218	Know necessity of rat watering points
2.41	168	Understand bacterial standards and their application
	245	Ability to cooperate with Civil Defense Department in catastrophe
2.40	6	Knowledge of the professional jargon of the discipline
	35	Know the basis of lagoon operation
	97	Knowledge of sanitation at a transfer station
	144	Recognize type and application of fire extinquishers
	167	Know diseases usually associated with natural bathing places
	202	Know toxic paint and toxic preservative materials
	228	Know "adequate toilet facilities" for number of employees
	271	Understand vector-borne disease transmission
2.39	49	Know proper use of herbicides and pesticides in nuisance control
	78	Know the various means used to monitor air pollution
	169	Understand recirculation systems
	199	Know regulations relative to handrails on steps
2.38	30	Know the relationship between soil types and effluent absorption
	189	Know required contact times and strengths of various disinfectants
	215	Know how various diseases are transmitted from rodents to man
2.37	143	Ability to recognize fire safety hazards in motels and hotels
	197	Ability to recognize adequate heating facilities
2.36	38	Know lagoon maintenance requirements
	100	Understand definition of noise as compared to sound
	141	Understand fire regulations and standards
	145	Know the reservoir of communicable disease endemic to the area
	148	Understand the relationship between wild animal population and rabies
	185	Understand relationship of cow herd health and human disease transmission
	260	Know which agents may cause respiratory disease
	299	Know proper use of pesticides in all types of institutions
2.35	66	Be able to define air pollution
	109	Know principal sources of community noises
	110	Understand noise prevention methods
	187	Know the significance of phosphatase in pasteurized milk
	257	Recognize agents causing disabilities
	261	Know which agents may affect the skin
	279	Know naturalistic mosquito abatement methods
2.34	31	Ability to read sanitary plot maps and simple blueprints
	72	Name the six pollutants specified in the Clean Air Act

TABLE II - Continued

CNF	Item No.	Item Description
2.34 (Cont'd)	147	Understand definitions of epidemic, endemic, pandemic, sylvan and urban
	170	Ability to interpret analysis results
	220	Know where IOSHA Laws apply and where local department has responsibility
	250	Ability to run carbon monoxide field test
2.33	131	Understand standards of floor space and cubic air space for occupancy
	137	Ability to recognize adequate laundry facilities in migrant labor camps
	249	Understand use of protective clothing and devices
	264	Have completed Red Cross First Aid Training
	305	Know when air gaps are required on plumbing fixtures
	306	Know sanitary methods of disposal of dressings and laboratory cultures
2.32	74	Know three respiratory diseases that tend to be aggravated by air pollution
	259	Know what safety devices are needed in a given situation
	268	Know life cycles of insects of public health importance
	270	Know how to calculate ppm and mix insecticides
	282	Know legal procedure to enforce local animal control code
	284	Know local requirements for restrictions of numbers of animals
2.31	9	Ability to be a court witness
	111	Understand noise abatement methods
	219	Understand fumigant methods
	253	Understand occupational diseases caused by harmful situations
2.30	82	Knowledge of soils
	161	Ability to read and evaluate a flow diagram
	229	Know where eating and smoking areas are located in a plant
	304	Know proper handling methods of soiled mops
2.29	75	Be able to name three air pollution control devices
	204	Know density and space requirements
	217	Know how to mix rodent baits
	233	Know what protective clothing is required in dusty conditions
	239	Understand hazards of continuous X-ray exposure
2.28	113	Know acceptable standards of noise levels for homes and industry
	139	Know ratio of plumbing-fixtures-to-population of day camps
	162	Know cause of mud ball in filters
	177	Ability to check time and temperature on both HTST and Batch Pasteurizers
	201	Know window and skylight and/or artificial light required
2.27	127	Understand quality control methods in water treatment plants
	129	Knowledge of State Urban Water Supply and Sewerage Systems Act
	134	Know how to calculate the volume of water required per person

TABLE II - Continued

CNF	Item No.	Item Description
2.27 (Cont'd)	214	Know tracking powders and how to use them
	230	Know what "threshold limit values" are for toxic chemicals
	232	Know significance of oral, dermal, and inhalation exposure
	248	Know what to do in case of a radioactive spill
	307	Know cleaning methods of refuse chutes and dumbwaiters
2.26	37	Know lagoon safety requirements
	44	Know areas of a community which exclude specific classes of animals by zoning
	222	Know the definition of noise
	235	Understand radiation exposure
2.25	115	Know the potential ways for increasing the usable water supply
	166	Know recommended depth of diving area to height of diving board
	221	Know what decibel range hearing loss starts
2.24	206	Ability to recognize Norway Rat and Roof Rat
	302	Know acceptable methods of cleaning and disinfecting different kinds of floors
	309	Understand soiled laundry handling problems in institutions
2.23	102	Ability to define decibels
	224	Know relationship between duration of noise exposure and decibel level
	288	Know sanitary requirements for stockyards
	308	Know difference in requirements of cross infection control in nursing homes and hospitals
2.22	108	Knowledge of value of sound muffs
	140	Know space requirements for outdoor campsites
	223	Understand occupational causes of hearing loss
2.21	32	Ability to design and size systems to fit existing conditions
	79	Know several deleterious effects of air pollution other than health effects
	151	Understand reproduction and physiology of bacteria
	182	Understand application of the "holding tube"
	286	Understand acceptable animal feed storage
	297	Know illumination standards for institutional kitchens
2.20	40	Know the public health hazards of waste disposal system failure
	70	Know the effects of meteorology and topography on air pollution
	303	Understand proper location of air intake and exhaust systems
2.19	86	Understand the significance and control of leachate
	150	Understand the transmission of zoonosis
	216	Ability to estimate age of rodent signs
	227	Understand relationship between accident rate and housekeeping
	278	Know the flight range of various mosquitos

TABLE II - Continued

CNF	Item No.	Item Description
2.18	21	Understand spring development as a domestic water source
	73	Know the local ambient air quality standards for each of the six pollutants
	126	Knowledge of the Zone of Aeration
2.17	69	Know what a temperature inversion is
	156	Know the general effects of light on bacteria
	175	Know how to check a leak protector valve
	183	Know the differential in pressure of raw and pasteurized milk in HTST units
	213	Ability to estimate size of rodent population
	281	Know wild host animal of zoonosis in your area
2.15	50	Ability to recognize all stages of life cycles of disease vectors
	101	Understand undesirable hearing changes as result of noise levels
	184	Understand mastitis control
	242	Know effect of radiation on living tissue
2.14	77	Know the Ringelmann System of defining visible air pollutants
	159	Know the term "Thermal Death Time"
	241	Know who is responsible for disposal of radioactive waste
	265	Understand use of keys in insect identification
2.13	120	Knowledge of the Floatation Process
2.12	236	Ability to use dosimeter and Geiger counter
	238	Know the significance of alpha, beta, and gamma exposure
	254	Understand physiological distress due to agents in industrial atmosphere
	280	Know zoonosis indigenous to wild life of your area
2.11	155	Knowledge of active and passive immunity
	263	Ability to evaluate an industrial hygiene problem
2.10	121	Knowledge of the Continuous Regeneration Process
	300	Know and apply occupancy standards to all types of institutions
2.09	255	Understand abnormal stress due to improper work methods
2.07	112	Understand application of sound proofing buildings and offices
	231	Understand metric system of measurements
	234	Know how to run field tests for atmospheric contamination
	240	Know acceptable disposal sites
	246	Understand the terms: Electron, Proton, Neutron
	292	Know epidemiological procedures for zoonosis
2.06	48	Ability to recognize noxious weeds
	107	Knowledge of acoustical or sound-absorbing walls
	176	Know how to operate a HTST flow diversion valve

TABLE II - Continued

CNF	Item No.	Item Description
2.06 (Cont'd)	298	Know water volume per bed and temperature standards for nursing homes
2.05	174	Be able to calculate and maneuver bathing load
	179	Understand use of vacuum chamber in odor and taste control
2.04	89	Ability to calculate volumes of refuse and cover material
2.03	80	Understand the relationship between air pollutants and allergies
	105	Knowledge of frequency of noise
	247	Understand "half life" of an isotope
2.02	47	Know the procedures in processing citizen-initiated complaints
	58	Ability to evaluate location of vending machines
	67	Know the primary gaseous components in the atmosphere
	106	Know what an ondimeter is
	157	Knowledge of intestinal nematodes
2.01	290	Know T.B. and brucellosis control methods in dairy cattle
2.00	104	Knowledge of pressure level of noise
	122	Knowledge of removing fluorides from water
1.99	84	Knowledge of acceptable roads within the landfill
1.98	243	Have ability to monitor radiation from X-ray machine
	301	Know methods of disinfecting operating rooms
1.97	103	Ability to define frequencies in cycles per second
1.96	118	Know how to study the flood characteristics of a stream
	158	Knowledge of Cestodes and Trematodes
	244	Know fission from fusion
1.95	11	Ability to calculate volumes of water required at an installation
1.94	19	Know how to run a "yield and drawdown" test
	36	Ability to size lagoons to a given system
1.93	55	Ability to size kitchen ventilation systems
	291	Know psittacosis control procedures
1.90	12	Ability to calculate peak load of a water system
	88	Ability to evaluate compaction equipment
1.88	68	Know what the adiabatic lapse rate is
1.87	13	Ability to size systems to meet load requirements
	76	Be able to discuss the synergistic effect of particulate and sulfur dioxide
1.86	180	Know how to calculate logarithmic average of bacterial counts
1.84	237	Understand isotopic forms of elements

TABLE II - Continued

CNF	Item No.	Item Description
1.82	154	Knowledge of the Fluorescent Antibody Test
1.79	92	Estimate net weight on volume of loads
1.78	94	Knowledge of a Systems Analysis Concept
	95	Knowledge of Volume Reductions Systems
1.64	46	Ability to estimate approximate age of fowl
	90	Ability to route pickup crews
1.51	45	Ability to recognize sex of animals and fowl
1.49	83	Ability to operate landfill equipment
1.45	91	Know maintenance procedures on equipment

Table II reveals six items with a CNF of 2.80 or above. The most needed skill as judged by the total population is the ability to differentiate between sanitary and unsanitary conditions by the sanitarian aide (#43). Closely following in descending order are knowledge of codes (#1), ability to cooperate with other departments or agencies (#10), public relations (#2), dependable work habits (#5) and the ability to recognize public health nuisances (#41). The least desirable competencies needed by the sanitarian aide in the opinions of the respondents are those with a CNF rating below 2.00. Table II shows twenty-eight items placed in this category. Starting with the least important in the opinion of the total survey population they are: Knowledge of maintenance procedures on landfill equipment (#91), ability to operate landfill equipment (#83), ability to recognize sex of animals and fowl (#45), ability to estimate approximate age of fowl (#46), ability to route garbage pickup crews (#90), knowledge of a volume reduction system (#95), knowledge of systems concept analysis (#94), and ability to esitmate net weight or volume of refuse on loads coming to landfill (#92). Other items in this category are found in Table II.

Table III provides the data gathered from the 147 questionnaires received from Iowa board of health chairmen that responded to the questionnaire.

TABLE III

COMPETENCY NEED FACTORS IN DESCENDING ORDER
OF IMPORTANCE BY
IOWA BOARD OF HEALTH CHAIRMEN

CNF	Item No.	Item Description
2.84	165	Understand relationship of pH to chlorine
2.83	1	Knowledge of codes, laws, rules and regulations pertaining to work
2.82	143	Ability to recognize fire safety hazards in motels and hotels
2.80	116	Ability to take legal water samples
2.78	128	Ability to sample chlorinated water
	205	Know accepted safeguards for various poisons
2.77	34	Ability to recognize acceptable installation
2.76	191	Ability to recognize acceptable toilet facilities
2.75	2	Ability with public relations with public
	4	Good personal hygiene
	43	Ability to differentiate between sanitary and unsanitary conditions
2.74	138	Recognize cross connections between water and sewage systems
2.72	23	Know the possible routes of contamination in each type of well
	24	Ability to sample water supplies
	40	Know the public health hazards of waste disposal system failure
2.71	5	Dependable work habits
2.70	18	Know the sanitary precautions for each type of well
	39	Ability to recognize system failure
	93	Know sanitary landfill standards
2.69	14	Ability to recognize need of disinfection
	16	Ability to recognize different types of wells
	27	Know the public health hazards of a contaminated system
	33	Ability to inspect existing systems
	41	Ability to recognize public health aspects of a nuisance
	296	Ability to recognize unclean conditions by sight and smell
2.68	119	Knowledge of techniques used to treat water
	133	Recognize health hazards at summer camps
2.66	20	Know how to disinfect a water source and system
	163	Ability to take legal swimming pool water samples
2.64	124	Knowledge of the types of chemicals used for emergency chlorination
	130	Understand and apply standards for semi-public water and sewage systems
	276	Ability to recognize mosquito breeding areas
	289	Know how to handle a rabid animal
2.62	193	Ability to recognize acceptable bathing facilities
	194	Understand the definitions in the State Housing Code

TABLE III - Continued

CNF	Item No.	Item Description
2.61	64	Recognize safe and unsafe food handling procedures
2.60	99	Understand community-wide solid waste control methods
	123	Ability to do a sanitary survey of water supply
	171	Ability to run field tests for chlorine and pH
	190	Ability to recognize acceptable kitchen facilities
	203	Know rat proofing methods
	226	Know when safety equipment must be readily available
	258	Recognize conditions causing disabilities and accidents
	264	Have completed Red Cross First Aid Training
2.59	10	Ability to cooperate and work with other departments and agencies
	22	Ability to inspect and recognize each type of well construction
	65	Recognize good personal hygiene
2.58	198	Know plumbing fixtures required in dwellings
	260	Know which agents may cause respiratory disease
	283	Know proper procedures in human rabies exposure
2.57	3	Ability to write meaningful and intelligent reports
	7	Understand methods of gathering and preserving evidence
	15	Ability to run field test for disinfectant residual
	62	Understand the control of pathogenic organisms food service establishments
2.56	63	Recognize acceptable refrigeration facilities
	71	Name five major sources of air pollution
2.56 (cont'd)	144	Recognize type and application of fire extinguishers
	164	Understand algae control
	210	Ability to recognize rodent harborages
	251	Ability to recognize dangerous situations in industrial plants
	261	Know which agents affect the skin
	267	Know insects of public health importance
	274	Know sanitary storage methods of insect breeding materials
	293	Know how to get samples in safe, legal manner
2.54	17	Ability to recognize cross connections
	53	Ability to inspect eating and drinking establishments under applicable codes
	60	Understand control of pests in food service establishments
	87	Know proper compaction and cover procedures
	92	Estimate net weight on volume of loads
	125	Ability to define "potable water"
	141	Understand fire regulations and standards
	142	Understand and be able to explain use of pesticides in camps
	173	Understand use of chlorine, alum and soda ash
	181	Ability to take legal milk samples
2.53	211	Know standards for storing materials to deter rodents
	220	Know where IOSHA Laws apply and where local department has responsibility
	257	Recognize agents causing disabilities
	262	Know which state department is responsible in case of an industrail accident
	273	Know materials in which flies will lay eggs

TABLE III - Continued

CNF	Item No.	Item Description
2.52	26	Know the procedure to seal an abandoned well
	47	Know the procedures in processing citizen-initiated complaints
	51	Understand the S.N.F. standards relative to food service equipment
2.51	25	Ability to interpret water supply analysis reports
	256	Ability to work with plant safety officer
	287	Ability to cooperate with Humane Society
2.50	52	Ability to run field tests on dishwashing machines and sanitizing solutions
	78	Know the various means used to monitor air pollution
	81	Understand air pollution warnings, alerts and emergencies
2.49	28	Know and have the ability to apply standards to privies
	207	Know effective rat proofing methods
	225	Know where protective clothing must be work
	259	Know what safety devices are needed in a given situation
	272	Know intermediate hosts of insects of public health importance
	277	Understand water ponding control as a mosquito control tool
2.48	6	Knowledge of the professional jargon of the discipline
	29	Ability to accomplish percolation tests
	30	Know the relationship between soil types and effluent absorption
	59	Ability to evaluate cleanliness of vending machines
	98	Know refuse control measure at camps and transient lodging facilities
2.48 (cont'd)	160	Know the meaning of High-free Residual Chlorine"
2.47	208	Know diseases spread by rodents to man
	266	Know major disease spread to man by insect
	270	Know how to calculate ppm and mix insecticides
	295	Know the route of infection transmission in nursing homes
2.46	31	Ability to read sanitary plot maps and simple blueprints
	61	Recognize hazardous chemicals and know their uses
	115	Know the potential ways for increasing the usable water supply
	117	Know the functions of a reservoir
	129	Knowledge of State Urban Water Supply and Sewerage Systems Act
	132	Ability to apply sanitary standards to migratory labor camps
	188	Know farm storage mild temperature requirements
2.45	35	Know the basis of lagoon operatio
	57	Recognize acceptable single service utensils
2.44	109	Know principal sources of community noises
	114	Know the level of decibels that causes some permanent hearing loss
	131	Understand standards of floor space and cubic air space for occupancy
	178	Know bacterial and chemical standards for both raw and
	189	Know required contact times and strengths of various disinfectants
	196	Know the responsibilities of occupants of dwelling
	230	Know what "threshold limit values" are for toxic chemicals
	299	Know proper use of pesticides in all types of institutions
	307	Know cleaning methods of refuse chutes and dumbwaiters

TABLE III - Continued

CNF	Item No.	Item Description
2.43	37	Know lagoon safety requirements
	42	Ability to assist pet owners in fly, rodent, and odor control
2.42	100	Understand definition of noise as compared to sound
	110	Understand noise prevention methods
	127	Understand quality control methods in water treatment plants
	135	Understand vector control in camps
	195	Know the rsponsibilities of owners of dwelling
	200	Know meaning of deteriorated and dilapidated
	209	Know house mouse control methods
	212	Ability to recognize restricted substances by name
	228	Know "adequate toilet facilities" for number of employees
	233	Know what protective clothing is required in dusty conditions
	245	Ability to cooperate with Civil Defense Department in catastrophe
	252	Know good housekeeping practices
2.41	56	Understand sanitization of multi-use utensils
2.40	72	Name the six pollutants specified in the Clean Air Act
	85	Know how to control blow paper
	162	Know cause of mud ball in filters
	186	Know the significance of coliform bacteria in pasteurized milk
	217	Know how to mix rodent baits
	219	Understand fumigant methods
	232	Know significance of oral, dermal, and inhalation exposure
	253	Understand occupational diseases caused by harmful situations
2.40 (cont'd)	282	Know legal procedure to enforce local animal control code
2.39	54	Ability to recognize cross connections in plumbing
2.38	38	Know lagoon maintenance requirements
	82	Knowledge of soils
	139	Know ratio of plumbing-fixtures-to-population of day camps
	172	Know requirements of safety equipment
	192	Ability to recognize acceptable sleeping facilities
	215	Know how various diseases are transmitted from rodents to man
	285	Know evidence of lack of sanitary manure storage
	294	Know modes of transmission for salmonella from pets to human
2.36	97	Knowledge of sanitation at a transfer station
	111	Understand noise abatement methods
	137	Ability to recognize adequate laundry facilities in migrant labor camps
	146	Know the mode of transmission of vector-borne diseases
	168	Understand bacterial standards and their application
	248	Know what to do in case of a radiactive spill
	249	Understand use of protective clothing and devices
2.35	49	Know proper use of herbicides and pesticides in nuisance control
2.34	8	Knowledge of enforcement procedures
	66	Be able to define air pollution
	169	Understand recirculation systems
2.33	223	Understand occupational causes of hearing loss
	250	Ability to run carbon monoxide field test
	271	Understand vector-borne disease transmission

TABLE III - Continued

CNF	Item No.	Item Description
2.32	96	Knowledge of vector control
	108	Knowledge of value of sound muffs
	145	Know the reservoir of communicable disease endemic to the area
	167	Know diseases usually associated with natural bathing places
	306	Know sanitary methods of disposal of dressings and laboratory cultures
2.31	218	Know necessity of rat watering points
	268	Know life cycles of insects of public health importance
	284	Know local requirements for restrictions of numbers of animals
2.30	79	Know several deleterious effects of air pollution other than health effects
	113	Know acceptable standards of noise levels for homes and industry
	161	Ability to read and evaluate a flow diagram
	177	Ability to check time and temperature on both HTST and Batch Pasteurizers
	197	Ability to recognize adequate heating facilities
2.29	199	Know regulations relative to handrails on steps
	236	Ability to use dosimeter and Geiger counter
	239	Understand hazards of continuous X-ray exposure
2.28	89	Ability to calculate volumes of refuse and cover material
	121	Knowledge of the Continuous Regeneration Process
	152	Understand the difference between aerobic and anaerobic bacteria
2.27	229	Know where eating and smoking areas are located in a plant
	288	Know sanitary requirements for stockyards
2.26	70	Know the effects of meteorology and topography on air pollution
	73	Know the local ambient air quality standards for each of the six pollutants
	140	Know space requirements for outdoor campsites
	166	Know recommended depth of diving area to height of diving board
	187	Know the significance of phosphatase in pasteurized milk
2.24	122	Knowledge of removing fluorides from water
	222	Know the definition of noise
	263	Ability to evaluate an industrial hygiene problem
	302	Know acceptable methods of cleaning and disinfecting different kinds of floors
2.22	120	Knowledge of the Floatation Process
	147	Understand definitions of epidemic, endemic, pandemic, sylvan and urban
	170	Ability to interpret analysis results
	182	Understand application of the "holding tube"
	254	Understand physiological distress due to agents in industrial atmosphere
	275	Know mosquito control methods
	279	Know naturalistic mosquito abatement methods
	309	Understand soiled laundry handling problems in institutions
2.21	44	Know areas of a community which exclude specific classes of animals by zoning
2.20	88	Ability to evaluate compaction equipment
	126	Knowledge of the Zone of Aeration

TABLE III - Continued

CNF	Item No.	Item Description
2.20 (cont'd)	134	Know how to calculate the volume of water required per person
	183	Know the differential in pressure of raw and pasteurized milk in HTST units
	235	Understand radiation exposure
	255	Understand abnormal stress due to improper work methods
	308	Know difference in requirements of cross infection control in nursing homes and hospitals
2.19	13	Ability to size systems to meet load requirements
	32	Ability to design and size systems to fit existing conditions
2.18	9	Ability to be a court witness
	175	Know how to check a leak protector valve
	179	Understand use of vacuum chamber in odor and taste control
	204	Know density and space requirements
	214	Know tracking powders and how to use them
	242	Know effect of radiation on living tissue
	280	Know zoonosis indigenous to wild life of your area
	286	Understand acceptable animal feed storage
2.17	55	Ability to size kitchen ventilation systems
2.16	80	Understand the relationship between air pollutants and allergies
	102	Ability to define decibels
	159	Know the term "Thermal Death Time"
	202	Know toxic paint and toxic preservative materials
	221	Know what decibel range hearing loss starts
	224	Know the relationship between duration of noise exposure and decibel level
2.16 (cont'd)	303	Understand proper location of air intake and exhaust systems
2.14	101	Understand undesirable hearing changes as result of noise levels
	150	Understand the transmission of zoonosis
	156	Know the general effect of light on bacteria
2.13	227	Understand relationship between accident rate and housekeeping
	231	Understand metric system of measurements
	240	Know acceptable disposal sites
	241	Know who is responbile for disposal of radioactive waste
	278	Know the flight range of various mosquitos
2.12	36	Ability to size lagoons to a given system
	77	Know the Ringelmann System of defining visible air pollutants
	86	Understand the significance and control of leachate
	155	Knowledge of active and passive immunity
2.10	118	Know how to study the flood characteristics of a stream
	157	Knowledge of intestinal nematodes
2.09	216	Ability to estimate age of rodent signs
	234	Know how to run field tests for atmospheric contamination
2.08	11	Ability to calculate volumes of water required at an installation
	58	Ability to evaluate location of vending machines
	75	Be able to name three air pollution control devices
	84	Knowledge of acceptable roads within the landfill
2.07	213	Ability to estimate size of rodent population
	297	Know illumination standards for institutional kitchens

TABLE III - Continued

CNF	Item No.	Item Description
2.07 (cont'd)	300	Know and apply occupancy standards to all types of institutions
	305	Know when air gaps are required on plumbing fixtures
2.06	50	Ability to recognize all stages of life cycles of disease vectors
	69	Know what a temperature inversion is
	105	Knowledge of frequency of noise
	158	Knowledge of Cestodes and Trematodes
	176	Know how to operate a HTST flow diversion valve
	184	Understand mastitis control
2.04	19	Know how to run a "yield and drawdown" test
	48	Ability to recognize noxious weeds
	67	Know the primary gaseous components in the atmosphere
	94	Knowledge of a Systems Analysis Concept
	174	Be able to calculate and maneuver bathing load
	206	Ability to recognize Norway Rat and Roof Rat
2.02	74	Know three respiratory diseases that tend to be aggravated by air pollution
	106	Know what an ondimeter is
	180	Know how to calculate logarithmic average of bacterial counts
	265	Understand use of keys in insect identification
2.00	104	Knowledge of pressure level of noise
	238	Know the significance of alpha, beta, and gamma exposure
	244	Know fission from fusion
	269	Know proper use of insecticides
	298	Know water volume per bed and temperature standards for nursing home
1.98	103	Ability to define frequencies in cycles per second
	292	Know epidemiological procedures for zoonosis
	301	Know methods of disinfecting operating rooms
1.96	21	Understand spring development as a domestic water source
	76	Be able to discuss the synergistic effect of particulate and sulfur dioxide
	153	Understand pasteurization, sanitation, and sterilization
	290	Know T.B. and brucellosis control methods in dairy cattle
1.92	12	Ability to calculate peak load of a water system
	149	Understand dog and cat control ordinances used in human rabies cases
1.91	281	Know wild host animal of zoonosis in your area
	291	Know psittacosis control procedures
1.90	148	Understand the relationship between wild animal population and rabies
	154	Knowledge of the Fluorescent Antibody Test
1.88	68	Know what the adiabatic lapse rate is
	95	Knowledge of Volume Reductions Systems
	136	Understand electrical, sewage, and water hookups in public campsites
1.87	243	Have ability to monitor radiation from X-ray machine
1.84	151	Understand reproduction and physiology of bacteria
1.82	90	Ability to route pickup crews
	247	Understand "half life" of an isotope

TABLE III - Continued

CNF	Item No.	Item Description
1.80	201	Know window and skylight and/or artificial light required
1.78	83	Ability to operate landfill equipment
1.73	237	Understand isotopic forms of elements
	246	Understand the term: Electron, Proton, Neutron
1.66	112	Understand application of sound proofing buildings and offices
1.62	91	Know maintenance procedures on equipment
1.59	45	Ability to recognize sex of animals and fowl
1.58	107	Knowledge of acoustical or sound-absorbing walls
1.51	304	Know proper handling methods of soiled mops
1.46	46	Ability to estimate approximate age of fowl
1.42	185	Understand relationship of cow herd health and human disease transmission

A study of the responses from this population sub-group indicates that four items scored a CNF above 2.79. These are: Ability to take legal water samples (#116), ability to recognize fire and safety hazards in transient lodging (#143), knowledge of applicable codes, laws, rules, etc. (#1), and understand relationship between pH and chlorine residual in potable water. There are 31 items with a CNF below 2.00 as reported by this population sub-group. The least of these are: Understanding the dairy cow herd health to human disease (#185), ability to estimate approximate age of fowl (#46), know proper method of handling soiled mops in institutions (#304). The other items as listed by item number 107, 45, 91, 112, 246, 237, and 83 show a CNF of less than 2.00.

Table IV assembles the data from the 41 questionnaires returned by the Iowa health department administrators included in the survey.

TABLE IV

COMPETENCY NEED FACTORS IN DECENDING ORDER
OF IMPORTANCE BY IOWA BOARD OF HEALTH ADMINISTRATORS

CNF	Item No.	Item Description
3.00	2	Public relations
	5	Dependable work habits
	24	Sample water supplies
	27	Know the public health hazards of a contaminated system
	40	Know the public health hazards of waste disposal system failure
	43	Ability to differentiate between sanitary and unsanitary conditions
2.91	4	Good personal hygiene
	17	Ability to recognize cross connections
	29	Ability to accomplish percolation tests
	33	Ability to inspect existing system
	52	Ability to run field tests on dishwashing machines and sanitizing solutions
	53	Ability to inspect eating and drinking establishments under applicable codes
2.87	131	Understand standards of floor space and cubic air space for occupancy
	163	Ability to take legal swimming pool water samples
	191	Ability to recognize acceptable toilet facilities
	210	Ability to recognize rodent harborages
2.82	1	Knowledge of codes, laws, rules and regulations pertaining to work
	7	Understand methods of gathering and preserving evidence
	14	Ability to recognize need of disinfection
	18	Know the sanitary precautions for each type of well
	20	Know how to disinfect a water source and system
	34	Ability to recognize acceptable installation
	39	Recognize sewage system failure
	41	Ability to recognize public health aspects of a nuisance
	47	Know the procedures in processing citizen-initiated complaints
	54	Ability to recognize cross connections in plumbing
	56	Understand sanitization of multi-use utensils
	57	Recognize acceptable single service utensils
	59	Ability to evaluate cleanliness of vending machines
	60	Understand control of pests in food service establishments
	63	Recognize acceptable refrigeration facilities
	64	Recognize safe and unsafe food handling procedures
	65	Recognize good personal hygiene
2.80	85	Know how to control blow paper
	138	Recognize cross connections between water and sewage systems
	171	Ability to run field tests for chlorine and pH
	186	Know the significance of coliform bacteria in pasteurized milk
	193	Ability to recognize acceptable bathing facilities
2.73	10	Ability to cooperate and work with other departments and agencies

TABLE IV - Continued

CNF	Item No.	Item Description
2.73 (Cont'd)	15	Ability to run field test for disinfectant residual
	16	Ability to recognize different types of wells
	26	Know the procedure to seal an abandoned well
	28	Know and have the ability to apply standards to privies
	42	Ability to assist pet owners in fly, rodent, and odor control
	61	Recognize hazardous chemicals and know their uses
	62	Understand the control of pathogenic organisms food service establishments
	93	Know sanitary landfill standards
	97	Knowledge of sanitation at a transfer station
	125	Ability to define "potable water"
	128	Ability to sample chlorinated water
	135	Understand vector control in camps
	164	Understand algae control
	165	Understand relationship of pH to chlorine
	187	Know the significance of phosphatase in pasteurized milk
	192	Ability to recognize acceptable sleeping facilities
	199	Know regulations relative to handrails on steps
	205	Know accepted safeguards for various poisons
	211	Know standards for storing materials to deter rodents
2.66	96	Knowledge of vector control
	124	Knowledge of the types of chemicals used for emergency chlorination
	133	Recognize health hazards at summer camps
	136	Understand electrical, sewage, and water hookups in public campsites
	173	Understand use of chlorine, alum and soda ash
	182	Understand application of the "holding tube"
	185	Understand relationship of cow herd health and human disease transmission
	188	Know farm storage milk temperature requirements
	190	Ability to recognize acceptable kitchen facilities
	194	Understand the definitions in the State Housing Code
	195	Know the responsibilities of owners of dwelling
	196	Know the responsibilities of occupants of dwelling
	198	Know plumbing fixtures required in dwellings
	204	Know density and space requirements
2.65	3	Ability to write meaningful and intelligent reports
	22	Ability to inspect and recognize each type of well construction
	23	Know the possible routes of contamination in each type of well
	30	Know the relationship between soil types and effluent absorption
	51	Understand the S.N.F. standards relative to food service equipment
2.60	81	Understand air pollution warnings, alerts and emergencies
	87	Know proper compaction and cover procedures
	130	Understand and apply standards for semi-public water and sewage systems
	181	Ability to take legal milk samples
	197	Ability to recognize adequate heating facilities
	200	Know meaning of deteriorated and dilapidated

TABLE IV - Continued

CNF	Item No.	Item Description
2.60 (Cont'd)	267	Know insects of public health importance
	273	Know materials in which flies will lay eggs
	276	Ability to recognize mosquito breeding areas
	283	Know proper procedures in a human rabies exposure
	285	Know evidence of lack of sanitary manure storage
	287	Ability to cooperate with Humane Society
	293	Know how to get samples in safe, legal manner
2.55	6	Knowledge of the professional jargon of the discipline
	8	Knowledge of enforcement procedures
	37	Know lagoon safety requirements
	38	Know lagoon maintenance requirements
2.53	98	Know refuse control measure at camps and transient lodging facilities
	168	Understand bacterial standards and their application
	170	Ability to interpret analysis results
	178	Know bacterial and chemical standards for both raw and pasteurized milk
	201	Know window and skylight and/or artificial light required
	203	Know rat proofing methods
	207	Know effective rat proofing methods
	209	Know house mouse control methods
	218	Know necessity of rat watering points
	252	Know good housekeeping practices
	274	Know sanitary storage methods of insect breeding materials
	296	Ability to recognize unclean conditions by sight and smell
2.49	99	Understand community-wide solid waste control methods
2.47	78	Know the various means used to monitor air pollution
	102	Ability to define decibels
	119	Knowledge of techniques used to treat water
	121	Knowledge of the Continuous Regeneration Process
	137	Ability to recognize adequate laundry facilities in migrant labor camps
	142	Understand and be able to explain use of pesticides in camps
	146	Know the mode of transmission of vector-borne disease
	148	Understand the relationship between wild animal population and rabies
	149	Understand dog and cat control ordinances used in human rabies cases
	167	Know diseases usually associated with natural bathing places
	189	Know required contact times and strengths of various disinfectants
	202	Know toxic paint and toxic preservative materials
	212	Ability to recognize restricted substances by name
	269	Know proper use of insecticides
	275	Know mosquito control methods
	289	Know how to handle a rabid animal
	304	Know proper handling methods of soiled mops
2.46	49	Know proper use of herbicides and pesticides in nuisance control
2.40	71	Name five major sources of air pollution
	75	Be able to name three air pollution control devices
	100	Understand definition of noise as compared to sound
	109	Know principal sources of community noises

TABLE IV - Continued

CNF	Item No.	Item Description
2.40 (Cont'd)	117	Know the funtions of a reservoir
	123	Ability to do a sanitary survey of water supply
	143	Ability to recognize fire safety hazards in motels and hotels
	144	Recognize type and application of fire extinguishers
	145	Know the reservoir of communicable disease endemic to the area
	150	Understand the transmission of zoonosis
	160	Know the meaning of "High-free Residual Chlorine"
	161	Ability to read and evaluate a flow diagram
	216	Ability to estimate age of rodent signs
	225	Know where protective clothing must be worn
	226	Know when safety equipment must be readily available
	228	Know "adequate toilet facilities" for number of employees
	235	Understand radiation exposure
	250	Ability to run carbon monoxide field test
	277	Understand water ponding control as a mosquito control tool
	284	Know local requirements for restrictions of numbers of animals
	286	Understand acceptable animal feed storage
	294	Know modes of transmission for salmonella from pets to human
	305	Know when air gaps are required on plumbing fixtures
2.35	9	Ability to be a court witness
	25	Ability to interpret water supply analysis reports
	31	Ability to read sanitary plot maps and simple blueprints
	32	Ability to design and size systems to fit existing conditions
	35	Know the basis of lagoon operation
	44	Know areas of a community which exclude specific classes of animals by zoning
2.33	66	Be able to define air pollution
	72	Name the six pollutants specified in the Clean Air Act
	77	Know the Ringelmann System of defining visible air pollutants
	86	Understand the significance and control of leachate
	108	Knowledge of value of sound muffs
	113	Know the acceptable standards of noise levels for homes and industry
	114	Know the level of decibels that causes some permanent hearing loss
	126	Knowledge of the Zone of Aeration
	127	Understand quality control methods in water treatment plants
	132	Ability to apply sanitary standards to migratory labor camps
	134	Know how to calculate the volume of water required per person
	139	Know ratio of plumbing-fixtures-to-population of day camps
	147	Understand definitions of epidemic, endemic, pandemic, sylvan and urban
	151	Understand reproduction and physiology of bacteria

TABLE IV - Continued

CNF	Item No.	Item Description
2.33 (Cont'd)	152	Understand the difference between aerobic and anaerobic bacteria
	153	Understand pasteurization, sanitation, and sterilization
	184	Understand mastitis control
	208	Know diseases spread by rodents to man
	214	Know tracking powders and how to use them
	236	Ability to use dosimeter and Geiger counter
	239	Understand hazards of continuous X-ray exposure
	244	Know fission from fusion
	245	Ability to cooperate with Civil Defense Department in catastrophe
	248	Know what to do in case of a radioactive spill
	249	Understand use of protective clothing and devices
	253	Understand occupational diseases caused by harmful situations
	258	Recognize conditions causing disabilities and accidents
	266	Know major disease spread to man by insect
	272	Know intermediate hosts of insects of public health importance
	279	Know naturalistic mosquito abatement methods
	282	Know legal procedure to enforce local animal control code
	295	Know the route of infection transmission in nursing homes
2.28	50	Ability to recognize all stages of life cycles of disease vectors
2.27	69	Know what a temperature inversion is
	73	Know the local ambient air quality standards for each of the six pollutants
	74	Know three respiratory diseases that tend to be aggravated by air pollution
	105	Knowledge of frequency of noise
	110	Understand noise prevention methods
	111	Understand noise abatement methods
	140	Know space requirements for outdoor campsites
	175	Know how to check a leak protector valve
	177	Ability to check time and temperature on both HTST and Batch Pasteurizers
	183	Know the differential in pressure of raw and pasteurized milk in HTST units
	227	Understand relationship between accident rate and housekeeping
	233	Know what protective clothing is required in dusty conditions
	247	Understand "half life" of an isotope
	251	Ability to recognize dangerous situations in industrial plants
	256	Ability to work with plant safety officer
	262	Know which state department is responsible in case of an industrial accident
	264	Have completed Red Cross First Aid Training
	268	Know life cycles of insects of public health importance
	270	Know how to calculate ppm and mix insecticides
	271	Understand vector-borne disease transmission
	278	Know the flight range of various mosquitos
	288	Know sanitary requirements for stockyards

TABLE IV - Continued

CNF	Item No.	Item Description
2.27 (Cont'd)	290	Know T.B. and brucellosis control methods in dairy cattle
	306	Know sanitary methods of disposal of dressings and laboratory cultures
	307	Know cleaning methods of refuse chutes and dumb waiters
	309	Understand soiled laundry handling problems in institutions
2.25	48	Ability to recognize noxious weeds
2.20	101	Understand undesirable hearing changes as result of noise levels
	112	Understand application of sound proofing buildings and offices
	141	Understand fire regulations and standards
	156	Know the general effects of light on bacteria
	206	Ability to recognize Norway Rat and Roof Rat
	215	Know how various diseases are transmitted from rodents to man
	221	Know what decibel range hearing loss starts
	222	Know the definition of noise
	232	Know the significance of oral, dermal, and inhalation exposure
	242	Know effect of radiation on living tissue
	246	Understand the term: Electron, Proton, Neutron
	257	Recognize agents causing disabilities
	298	Know water volume per bed and temperature standards for nursing homes
	303	Understand proper location of air intake and exhaust systems
2.13	70	Know the effects of meteorology and topography on air pollution
	82	Knowledge of Soils
	84	Knowledge of acceptable roads within the landfill
	106	Know what an ondimeter is
	174	Be able to calculate and maneuver bathing load
	213	Ability to estimate size of rodent population
	224	Know relationship between duration of noise exposure and decibel level
	229	Know where eating and smoking areas are located in a plant
	259	Know what safety devices are needed in a given situation
	260	Know which agents may cause respiratory disease
	280	Know zoonosis indigenous to wild life of your area
	281	Know wild host animal of zoonosis in your area
	291	Know Psittacosis control procedures
	297	Know illumination standards for institutional kitchens
	299	Know proper use of pesticides in all types of institutions
	308	Know difference in requirements of cross infection control in nursing homes and hospitals
2.09	58	Ability to evaluate location of vending machines
2.07	103	Ability to define frequencies in cycles per second
	104	Knowledge of pressure level of noise
	115	Know the potential ways for increasing the usable water supply
	116	Ability to take legal water samples

TABLE IV - Continued

CNF	Item No.	Item Description
2.07 (Cont'd)	155	Knowledge of active and passive immunity
	162	Know cause of mud ball in filters
	166	Know recommended depth of diving area to height of diving board
	180	Know how to calculate logarithmic average of bacterial counts
	219	Understand fumigant methods
	220	Know where IOSHA Laws apply and where local department has responsibility
	265	Understand use of keys in insect indentification
	292	Know epidemiological procedures for zoonosis
	300	Know and apply occupancy standards to all types of institutions
	302	Know acceptable methods of cleaning and disinfecting different kinds of floors
2.00	21	Understand spring development as a domestic water source
	67	Know the primary gaseous components in the atmosphere
	76	Be able to discuss the synergistic effect of particulate and sulfur dioxide
	80	Understand the relationship between air pollutants and allergies
	118	Know how to study the flood characteristics of a stream
	129	Knowledge of State Urban Water Supply and Sewerage Systems Act
	159	Know the term "Thermal Death Time"
	176	Know how to operate a HTST flow diversion valve
	179	Understand use of vacuum chamber in odor and taste control
	217	Know how to mix rodent baits
	223	Understand occupational causes of hearing loss
	237	Understand isotopic forms of elements
	238	Know the significance of alpha, beta, and gamma exposure
	243	Have ability to monitor radiation from X-ray machine
	263	Ability to evaluate an industrial hygiene problem
1.93	68	Know what the adiabatic lapse rate is
	154	Knowledge of the Fluorescent Antibody Test
	157	Knowledge of intestinal nematodes
	234	Know how to run field tests for atmospheric contamination
	240	Know acceptable disposal sites
	241	Know who is responsible for disposal of radioactive waste
	255	Understand abnormal stress due to improper work methods
	301	Know methods of disinfecting operating rooms
1.91	11	Ability to calculate volumes of water required at an installation
	12	Ability to calculate peak load of a water system
	13	Ability to size systems to meet load requirements
	36	Ability to size lagoons to a given system
	55	Ability to size kitchen ventilation systems
1.87	95	Knowledge of Volume Reductions Systems
	120	Knowledge of the Floatation Process
	230	Know what "threshold limit values" are for toxic chemicals

TABLE IV - Continued

CNF	Item No.	Item Description
1.87 (Cont'd)	231	Understand metric system of measurements
	261	Know which agents may affect the skin
1.86	169	Understand recirculation systems
1.83	19	Know how to run a "yield and drawdown" test
1.80	158	Knowledge of Cestodes and Trematodes
	254	Understand physiological distress due to agents in industrial atmosphere
1.73	45	Ability to recognize sex of animals and fowl
	88	Ability to evaluate compaction equipment
	107	Knowledge of acoustical or sound-absorbing walls
1.67	89	Ability to calculate volumes of refuse and cover material
	122	Knowledge of removing fluorides from water
1.64	46	Ability to estimate approximate age of fowl
1.60	92	Estimate net weight on folume of loads
	94	Knowledge of Systems Analysis Concept
1.53	172	Know requirements of safety equipment
1.47	79	Know several deleterious effects of air pollution other than health effects
	90	Ability to route pickup crews
1.27	91	Know maintenance procedures on equipment

This population sub-group places 38 survey items in the CNF category of 2.80 or above. Of these 38 items, this sub-group was unanimous in its opinion (CNF's of 3.00) regarding the importance of six competency needs. The six items are: public relations (#2), dependable work habits (#5), the ability to sample water supplies (#24), knowledge of the public health hazards of contaminated water systems (#27), knowledge of the public health hazards of waste disposal system failure (#40), and the competency to differentiate between sanitary and unsanitary conditions (#43).

The Iowa department administrators place 50 items or 16% of the questions below a CNF of 2.00. Therefore, the reader may wish to question the advisability of including these items in a curriculum for a sanitarian aide.

Table V presents the figures accumulated from the 126 questionnaires received from the respondents in the Iowa sanitarians population sub-group.

TABLE V

COMPETENCY NEED FACTORS IN DESCENDING ORDER OF IMPORTANCE BY IOWA SANITARIANS

CNF	Item No.	Item Description
2.94	43	Ability to differentiate between sanitary and unsanitary conditions
2.92	41	Ability to recognize public health aspects of a nuisance
2.90	4	Good personal hygiene
	27	Know the public health hazards of a contaminated system
	40	Know the public health hazards of waste disposal system failure
	53	Ability to inspect eating and drinking establishments under applicable codes
	64	Recognize safe and unsafe food handling procedures
2.89	2	Ability with public relations and with public
	33	Ability to inspect existing systems
	34	Ability to recognize acceptable installation
2.88	24	Ability to sample water supplies
	60	Understand control of pests in food service establishments
	62	Understand the control of pathogenic organisms in food service establishments
	63	Recognize acceptable refrigeration facilities
	65	Recognize good personal hygiene
2.86	5	Dependable work habits
	57	Recognize acceptable single service utensils
	124	Knowledge of the types of chemicals used for emergency chlorination
2.84	39	Ability to recognize system failure
	54	Ability to recognize cross connections in plumbing
	56	Understand sanitization of multi-use utensils
2.83	14	Ability to recognize need of disinfection
	86	Understand the significance and control of leachate
2.82	1	Knowledge of codes, laws, rules and regulations pertaining to work
2.80	3	Ability to write meaningful and intelligent reports
	171	Ability to run field tests for chlorine and pH
2.79	17	Ability to recognize cross connections
2.78	20	Know how to disinfect a water source and system
2.77	18	Know the sanitary precautions for each type of well
	85	Know how to control blow paper
	87	Know proper compaction and cover procedures
2.76	61	Recognize hazardous chemicals and know their uses
2.75	10	Ability to cooperate and work with other departments and agencies
	23	Know the possible routes of contamination in each type of well

TABLE V - Continued

CNF	Item No.	Item Description
2.74	138	Recognize cross connections between water and sewage systems
	163	Ability to take legal swimming pool water samples
2.73	22	Ability to inspect and recognize each type of well construction
2.72	47	Know the procedures in processing citizen-initiated complaints
	52	Ability to run field tests on dishwashing machines and sanitizing solutions
	210	Ability to recognize rodent harborages
2.71	29	Ability to accomplish percolation tests
2.70	59	Ability to evaluate cleanliness of vending machines
2.69	15	Ability to run field test for disinfectant residual
	133	Recognize health hazards at summer camps
	135	Understand vector control in camps
	191	Ability to recognize acceptable toilet facilities
2.67	16	Ability to recognize different types of wells
	26	Know the procedure to seal an abandoned well
	276	Ability to recognize mosquito breeding areas
2.65	7	Understand methods of gathering and preserving evidence
	165	Understand relationship of pH to chlorine
2.64	205	Know accepted safegards for various poisons
2.63	28	Know and have the ability to apply standards to privies
	146	Know the mode of transmission of vector-borne diseases
	178	Know bacterial and chemical standards for both raw and pasteurized milk
2.62	128	Ability to sample chlorinated water
	283	Know proper procedures in a human rabies exposure
2.61	6	Knowledge of the professional jargon of the discipline
2.60	8	Knowledge of enforcement procedures
2.59	211	Know standards for storing materials to deter rodents
	251	Ability to recognize dangerous situations in industrial plants
	252	Know good housekeeping practices
2.58	42	Ability to assist pet owners in fly, rodent, and odor control
2.57	25	Ability to interpret water supply analysis reports
	30	Know the relationship between soil types and effluent absorption
	153	Understand pasteurization, sanitation, and sterilization
	186	Know the significance of coliform bacteria in pasteurized milk
2.56	207	Know effective rat proofing methods
	267	Know insects of public health importance

TABLE V - Continued

CNF	Item No.	Item Description
2.56 (Cont'd)	273	Know materials in which flies will lay eggs
	274	Know sanitary storage methods of insect breeding materials
	275	Know mosquito control methods
2.55	164	Understand algae control
2.54	130	Understand and apply standards for semi-public water and sewage systems
	167	Know diseases usually associated with natural bathing places
	173	Understand use of chlorine, alum and soda ash
	193	Ability to recognize acceptable bathing facilities
	293	Know how to get samples in safe, legal manner
	296	Ability to recognize unclean conditions by sight and smell
2.53	51	Understand the S.N.F. standards relative to food service equipment
2.52	38	Know lagoon maintenance requirements
	49	Know proper use of herbicides and pesticides in nuisance control
2.51	96	Knowledge of vector control
	168	Understand bacterial standards and their application
	190	Ability to recognize acceptable kitchen facilities
	203	Know rat proofing methods
	209	Know house mouse control methods
	266	Know major disease spread to man by insect
2.49	32	Ability to design and size systems to fit existing conditions
	37	Know lagoon safety requirements
	119	Knowledge of techniques used to treat water
	142	Understand and be able to explain use of pesticides in camps
	170	Ability to interpret analysis results
	194	Understand the definitions in the State Housing Code
	195	Know the responsibilities of owners of dwelling
	196	Know the responsibilities of occupants of dwelling
	208	Know diseases spread by rodents to man
	269	Know proper use of insecticides
	277	Understand water ponding control as a mosquito control tool
	287	Ability to cooperate with Humane Society
	294	Know modes of transmission for salmonella from pets to human
2.46	99	Understand community-wide solid waste control methods
	152	Understand the difference between aerobic and anaerobic bacteria
	169	Understand recirculation systems
	215	Know how various diseases are transmitted from rodents to man
	253	Understand occupational diseases caused by harmful situations
	262	Know which state department is responsible in case of an industrial accident
	271	Understand vector-borne disease transmission
	289	Know how to handle a rabid animal
	305	Know when air gaps are required on plumbing fixtures

TABLE V - Continued

CNF	Item No.	Item Description
2.44	9	Ability to be a court witness
	35	Know the basis of lagoon operation
	200	Know meaning of deteriorated and dilapidated
	225	Know where protective clothing must be worn
	258	Recognize conditions causing disabilities and accidents
	279	Know naturalistic mosquito abatement methods
	285	Know evidence of lack of sanitary manure storage
2.43	93	Know sanitary landfill standards
	147	Understand definitions of epidemic, endemic, pandemic, sylvan and urban
	160	Know the maining of "High-free Residual Chlorine"
2.41	272	Know intermediate hosts of insects of public health importance
	295	Know the route of infection transmission in nursing homes
2.40	31	Ability to read sanitary plot maps and simple blueprints
	114	Know the level of decibels that causes come permanent hearing loss
	117	Know the functions of a reservoir
	123	Ability to do a sanitary survey of water supply
	132	Ability to apply sanitary standards to migratory labor camps
	145	Know the reservoir of communicable disease endemic to the area
	172	Know requirements of safety equipment
	181	Ability to take legal milk samples
2.38	192	Ability to recognize acceptable sleeping facilities
	198	Know plumbing fixtures required in dwellings
	206	Ability to recognize Norway Rat and Roof Rat
	212	Ability to recognize restricted substances by name
	221	Know what decibel range hearing loss starts
2.37	66	Be able to define air pollution
	126	Knowledge of the Zone of Aeration
2.36	199	Know regulations relative to handrails on steps
	218	Know necessity of rat watering points
	245	Ability to cooperate with Civil Defense Department in catastrophe
	282	Know legal procedure to enforce local animal control code
2.35	219	Understand fumigant methods
2.34	134	Know how to calculate the volume of water required per person
	136	Understand electrical, sewage, and water hookups in public campsites
	188	Know farm storage milk temperature requirements
2.33	197	Ability to recognize adequate heating facilities
	228	Know "adequate toilet facilities" for number of employees
	250	Ability to run carbon monoxide field test
	260	Know which agents may cause respiratory disease
2.32	50	Ability to recognize all stages of life cycles of disease vectors

TABLE V - Continued

CNF	Item No.	Item Description
2.31	98	Know refuse control measure at camps and transient lodging facilities
	185	Understand relationship of cow herd health and human disease transmission
	202	Know toxic paint and toxic preservative materials
	226	Know when safety equipment must be readily available
	229	Know where eating and smoking areas are located in a plant
	257	Recognize agents causing disabilities
	259	Know what safety devices are needed in a given situation
	261	Know which agents may affect the skin
	268	Know life cycles of insects of public health importance
	299	Know proper use of pesticides in all types of institutions
2.29	81	Understand air pollution warnings, alerts and emergencies
	137	Ability to recognize adequate laundry facilities in migrant labor camps
2.28	72	Name the six pollutants specified in the Clean Air Act
	150	Understand the transmission of zoonosis
	159	Know the term "Thermal Death Time"
	201	Know window and skylight and/or artificial light required
	214	Know tracking powders and how to use them
	222	Know the definition of noise
	297	Know illumination standards for institutional kitchens
	304	Know proper handling methods of soiled mops
	306	Know sanitary methods of disposal of dressings and laboratory cultures
2.26	141	Understand fire regulations and standards
	144	Recognize type and application of fire extinguishers
	151	Understand reproduction and physiology of bacteria
	162	Know cause of mud ball in filters
	166	Know recommended depth of diving area to height of diving board
	235	Understand radiation exposure
2.25	84	Knowledge of acceptable roads within the landfill
	97	Knowledge of sanitation at a transfer station
	100	Understand definition of noise as compared to sound
	102	Ability to define decibels
2.24	21	Understand spring development as a domestic water source
	44	Know areas of a community which exclude specific classes of animals by zoning
	116	Ability to take legal water samples
2.23	71	Name five major sources of air pollution
	74	Know three respiratory diseases that tend to be aggravated by air pollution
	148	Understand the relationship between wild animal population and rabies
	149	Understand dog and cat control ordinances used in human rabies cases
	189	Know required contact times and strengths of various disinfectants

TABLE V - Continued

CNF	Item No.	Item Description
2.23 (Cont'd)	204	Know density and space requirements
	213	Ability to estimate size of rodent population
	216	Ability to estimate age of rodent signs
	223	Understand occupational causes of hearing loss
	224	Know relationship between duration of noise exposure and decibel level
	239	Understand hazards of continuous X-ray exposure
	248	Know what to do in case of a radioactive spill
	254	Understand physiological distress due to agents in industrial atmosphere
	255	Understand abnormal stress due to improper work methods
	264	Have completed Red Cross First Aid Training
	284	Know local requirements for restrictions of numbers of animals
	307	Know cleaning methods of refuse chutes and dumbwaiters
	308	Know difference in requirements of cross infection control in nursing homes and hospitals
2.22	69	Know what a temperature inversion is
	82	Knowledge of soils
	139	Know ratio of plumbing-fixtures-to-population of day camps
2.21	302	Know acceptable methods of cleaning and disinfecting different kinds of floors
	303	Understand proper location of air intake and exhaust systems
2.20	73	Know the local ambient air quality standards for each of the six pollutants
	101	Understand undesirable hearing changes as result of noise levels
	111	Understand noise abatement methods
	127	Understand quality control methods in water treatment plants
	140	Know space requirements for outdoor campsites
	143	Ability to recognize fire safety hazards in motels and hotels
	184	Understand mastitis control
2.18	48	Ability to recognize noxious weeds
	217	Know how to mix rodent baits
	256	Ability to work with plant safety officer
	263	Ability to evaluate an industrial hygiene problem
	270	Know how to calculate ppm and mix insecticides
	278	Know the flight range of various mosquitos
	309	Understand soiled laundry handling problems in institutions
2.17	110	Understand noise prevention methods
	113	Know acceptable standards of noise levels for homes and industry
	121	Knowledge of the Floatation Process
	129	Knowledge of State Urban Water Supply and Sewerage Systems Act
	155	Knowledge of active and passive immunity
	156	Know the general effects of light on bacteria
	187	Know the significance of phosphatase in pasteurized milk

TABLE V - Continued

CNF	Item No.	Item Description
2.15	238	Know the significance of alpha, beta, and gamma exposure
	241	Know who is responsible for disposal of radioactive waste
	247	Understand "half life" of an isotope
	249	Understand use of protective clothing and devices
	281	Know wild host animal of zoonosis in your area
	292	Know epidemiological procedures for zoonosis
2.14	75	Be able to name three air pollution control devices
	78	Know the various means used to monitor air pollution
	106	Know what an ondimeter is
	109	Know principal sources of community noises
	115	Know the potential ways for increasing the usable water supply
	131	Understand standards of floor space and cubic air space for occupancy
2.13	220	Know where IOSHA Laws apply and where local department has responsibility
	230	Know what "threshold limit values" are for toxic chemicals
	242	Know effect of radiation on living tissue
	265	Understand use of keys in insect identification
2.11	79	Know several deleterious effects of air pollution other than health effects
	121	Knowledge of the Continuous Regeneration Process
	177	Ability to check time and temperature on both HTST and Batch Pasteurizers
2.10	232	Know significance of oral, dermal, and inhalation exposure
	233	Know what protective clothing is required in dusty conditions
	246	Understand the term: Electron, Proton, Neutron
	280	Know zoonosis indigenous to wild life of your area
	298	Know water volume per bed and temperature standards for nursing homes
2.09	108	Knowledge of value of sound muffs
2.08	227	Understand relationship between accident rate and housekeeping
	236	Ability to use dosimeter and Gieger counter
	240	Know acceptable disposal sites
	243	Have ability to monitor radiation from X-ray machine
	288	Know sanitary requirements for stockyards
2.06	11	Ability to calculate volumes of water required at an installation
	12	Ability to calculate peak load of a water system
	36	Ability to size lagoons to a given system
	157	Knowledge of intestinal nematodes
	158	Knowledge of Cestodes and Trematodes
	174	Be able to calculate and maneuver bathing load

TABLE V - Continued

CNF	Item No.	Item Description
2.05	122	Knowledge of removing fluorides from water
	234	Know how to run field tests for atmospheric contamination
	286	Understand acceptable animal feed storage
	300	Know and apply occupancy standards to all types of insititutions
2.03	175	Know how to check a leak protector valve
2.02	55	Ability to size kitchen ventilation systems
2.00	70	Know the effects of meteorology and topography on air pollution
	77	Know the Ringelmann System of defining visible air pollutants
	104	Knowledge of pressure level of noise
	112	Understand application of sound proofing buildings and offices
	183	Know the differential in pressure of raw and pasteurized milk in HTST units
	244	Know fission from fusion
1.98	13	Ability to size systems to meet load requirements
	58	Ability to evaluate location of vending machines
1.97	67	Know the primary gaseous components in the atmosphere
	107	Knowledge of acoustical or sound-absorbing walls
	290	Know T.B. and brucellosis control methods in dairy cattle
1.95	231	Understand metric system of measurements
	301	Know methods of disinfecting operating rooms
1.94	68	Know what the adiabatic lapse rate is
	80	Understand the relationship between air pollutants and allergies
	89	Ability to calculate volumes of refuse and cover material
	103	Ability to define frequencies in cycles per second
	154	Knowledge of the Fluorescent Antibody Test
	161	Ability to read and evaluate a flow diagram
	179	Understand use of vacuum chamber in odor and taste control
1.92	19	Know how to run a "yield and drawdown" test
1.91	118	Know how to study the flood characteristics of a stream
	125	Ability to define "potable water"
	182	Understand application of the "holding tube"
1.90	237	Understand isotopic forms of elements
1.89	76	Be able to discuss the synergistic effect of particulate and sulfur dioxide
1.86	176	Know how to operate a HTST flow diversion valve
1.85	291	Know psittacosis control procedures
1.74	92	Estimate net weight on volume of loads
	95	Knowledge of Volume Reductions Systems

TABLE V - Continued

CNF	Item No.	Item Description
1.69	88	Ability to evaluate compaction equipment
	180	Know how to calculate logarithmic average of bacterial counts
1.68	94	Knowledge of a Systems Analysis Concept
1.66	105	Knowledge of frequency of noise
1.46	45	Ability to recognize sex of animals and fowl
	90	Ability to route pickup crews
1.40	83	Ability to operate landfill equipment
1.34	46	Ability to estimate approximate age of fowl
	91	Know maintenance procedures on equipment

The professional sanitarians in Iowa scored 26 items in a category above a CNF of 2.79 in importance. They indicated that 36 items in the survey were of little importance. These 36 items were rated a CNF of below 2.00. The least important as indicated by this sub-group are: Knowledge of sanitary landfill equipment maintenance procedures (#91), ability to estimate the age of fowl (#46), have the ability to operate landfill equipment (#83), ability to route refuse pickup crews (#90), ability to recognize the sex of animals and fowl (#45), plus 26 others. This is 10% of the questions on the survey instruments the Iowa sanitarians placed in a very low category of desirability.

The resultant data received from Nebraska health administrators is presented in Table VI as follows. A total of 46 questionnaires were received from the health administrators in Nebraska.

TABLE VI

COMPETENCY NEED FACTORS IN DESCENDING ORDER
OF IMPORTANCE BY NEBRASKA HEALTH ADMINISTRATORS

CNF	Item No.	Item Description
2.95	43	Ability to differentiate between sanitary and unsanitary conditions
2.92	269	Know proper use of insecticides
2.90	4	Good personal hygiene
2.85	210	Ability to recognize rodent harborages
	211	Know standards for storing materials to deter rodents
	267	Know insects of public health importance
2.83	116	Ability to take legal water samples
	128	Ability to sample chlorinated water
	163	Ability to take legal swimming pool water samples
	171	Ability to run field tests for chlorine and pH
2.81	65	Recognize good personal hygiene
2.80	1	Knowledge of codes, laws, rules and regulations pertaining to work
	24	Ability to sample water supplies
2.77	203	Know rat proofing methods
	205	Know accepted safeguards for various poisons
	207	Know effective rat proofing methods
	209	Know house mouse control methods
	252	Know good housekeeping practices
	285	Know evidence of lack of sanitary manure storage
	296	Ability to recognize unclean conditions by sight and smell
2.76	2	Ability with public relations and with public
	5	Dependable work habits
	14	Ability to recognize need of disinfection
	23	Know the possible routes of contamination in each type of well
	40	Know the public health hazards of waste disposal system failure
	41	Ability to recognize public health aspects of a nuisance
	56	Understand sanitization of multi-use utensils
	57	Recognize acceptable single service utensils
	60	Understand control of pests in food service establishments
2.75	87	Know proper compaction and cover procedures
	93	Know sanitary landfill standards
	96	Knowledge of vector control
	124	Knowledge of the types of chemicals used for emergency chlorination
	133	Recognize health hazards at summer camps
	172	Know requirements of safety equipment

TABLE VI - Continued

CNF	Item No.	Item Description
2.71	16	Ability to recognize different types of wells
	27	Know the public health hazards of a contaminated system
	64	Recognize safe and unsafe food handling procedures
2.69	191	Ability to recognize acceptable toilet facilities
	217	Know how to mix rodent baits
	226	Know when safety equipment must be readily available
	273	Know materials in which flies will lay eggs
	289	Know how to handle a rabid animal
	293	Know how to get samples in safe, legal manner
2.67	98	Know refuse control measure at camps and transient lodging facilities
	146	Know the mode of transmission of vector-borne diseases
	162	Know cause of mud ball in filters
	173	Understand use of chlorine, alum and soda ash
2.66	3	Ability to write meaningful and intelligent reports
	34	Know the basis of lagoon operation
	47	Know the procedures in processing citizen-initiated complaints
	53	Ability to inspect eating and drinking establishments under applicable codes
2.65	10	Ability to cooperate and work with other departments and agencies
2.62	7	Understand methods of gathering and preserving evidence
	17	Ability to recognize cross connections
	22	Ability to inspect and recognize each type of well construction
	42	Ability to assist pet owners in fly, rodent, and odor control
	54	Ability to recognize cross connections in plumbing
	262	Know which state department is responsible in case of an industrial accident
	266	Know major disease spread to man by insect
	274	Know sanitary storage methods of insect breeding materials
	276	Ability to recognize mosquito breeding areas
	283	Know proper procedures in a human rabies exposure
2.61	190	Ability to recognize acceptable kitchen facilities
2.59	230	Know what "threshold limit values" are for toxic chemicals
2.58	85	Know how to control blow paper
	99	Understand community-wide solid waste control methods
	125	Ability to define "potable water"
	135	Understand vector control in camps
	138	Recognize cross connections between water and sewage systems
	140	Know space requirements for outdoor campsites
	142	Understand and be able to explain use of pesticides in camps

TABLE VI - Continued

CNF	Item No.	Item Description
2.58	186	Know the significance of coliform bacteria in pasteurized milk
2.57	18	Know the sanitary precautions for each type of well
	55	Ability to size kitchen ventilation systems
	59	Ability to evaluate cleanliness of vending machines
	62	Understand the control of pathogenic organisms in food service establishments
	63	Recognize acceptable refrigeration facilities
2.54	192	Ability to recognize acceptable sleeping facilities
	193	Ability to recognize acceptable bathing facilities
	218	Know necessity of rat watering points
	224	Know relationship between duration of noise exposure and decibel level
	228	Know "adequate toilet facilities" for number of employees
	272	Know intermediate hosts of insects of public health importance
	275	Know mosquito control methods
	299	Know proper use of pesticides in all types of institutions
	306	Know sanitary methods of disposal of dressings and laboratory cultures
2.52	15	Ability to run field test for disinfectant residual
	33	Ability to inspect existing systems
	39	Ability to recognize system failure
	61	Recognize hazardous chemicals and know their uses
2.51	44	Know areas of a community which exclude specific classes of animals by zoning
2.50	119	Knowledge of techniques used to treat water
	143	Ability to recognize fire safety hazards in motels and hotels
	145	Know the reservoir of communicable disease endemic to the area
	160	Know the meaning of "High-free Residual Chlorine"
	182	Understand application of the "holding tube"
2.48	49	Know proper use of herbicides and pesticides in nuisance control
2.46	220	Know where IOSHA Laws apply and where local department has responsibility
	225	Know where protective clothing must be worn
	233	Know what protective clothing is required in dusty conditions
	249	Understand use of protective clothing and devices
	268	Know life cycles of insects of public health importance
	279	Know naturalistic mosquito abatement methods
	284	Know local requirements for restrictions of numbers of animals
	286	Understand acceptable animal feed storage
	294	Know modes of transmission for salmonella from pets to human
	295	Know the route of infection transmission in nursing homes
	304	Know proper handling methods of soiled mops
	305	Know when air gaps are required on plumbing fixtures
	307	Know cleaning methods of refuse chutes and dumbwaiters

TABLE VI - Continued

CNF	Item No.	Item Description
2.43	8	Knowledge of enforcement procedures
	9	Ability to be a court witness
	20	Know how to disinfect a water source and system
2.42	71	Name five major sources of air pollution
	78	Know the various means used to monitor air pollution
	81	Understand air pollution warnings, alerts and emergencies
	97	Knowledge of sanitation at a transfer station
	110	Understand noise prevention methods
	123	Ability to do a sanitary survey of water supply
	144	Recognize type and application of fire extinguishers
	149	Understand dog and cat control ordinances used in human rabies cases
	164	Understand algae control
	175	Know how to check a leak protector valve
	176	Know how to operate a HTST flow diversion valve
	178	Know bacterial and chemical standards for both raw and pasteurized milk
2.38	194	Understand the definitions in the State Housing Code
	195	Know the responsibilities of owners of dwelling
	196	Know the responsibilities of occupants of dwelling
	208	Know diseases spread by rodents to man
	212	Ability to recognize restricted substances by name
	213	Ability to estimate size of rodent population
	214	Know tracking powders and how to use them
	222	Know the definition of noise
	229	Know where eating and smoking areas are located in a plant
	245	Ability to cooperate with Civil Defense Department in catastrophe
	248	Know what to do in case of a radioactive spill
	251	Ability to recognize dangerous situations in industrial plants
	256	Ability to work with plant safety officer
2.36	51	Understand the S.N.F. standards relative to food service equipment
2.34	6	Knowledge of the professional jargon of the discipline
	28	Know and have the ability to apply standards to privies
	35	Know the basis of lagoon operation
	52	Ability to run field tests on dishwashing machines and sanitizing solutions
	66	Be able to define air pollution
	74	Know three respiratory diseases that tend to be aggravated by air pollution
	82	Knowledge of soils
	100	Understand definition of noise as compared to sound
	117	Know the functions of a reservoir
	132	Ability to apply sanitary standards to migratory labor camps
	141	Understand fire regulations and standards
	155	Knowledge of active and passive immunity

TABLE VI - Continued

CNF	Item No.	Item Description
2.34 (Cont'd)	167	Know diseases usually associated with natural bathing places
	168	Understand bacterial standards and their application
	169	Understand recirculation systems
	170	Ability to interpret analysis results
	183	Know the differential in pressure of raw and pasteurized milk in HTST units
2.31	199	Know regulations relative to handrails on steps
	200	Know meaning of deteriorated and dilapidated
	202	Know toxic paint and toxic preservative materials
	204	Know density and space requirements
	215	Know how various diseases are transmitted from rodents to man
	216	Ability to estimate age of rodent signs
	219	Understand fumigant methods
	231	Understand metric system of measurements
	232	Know significance of oral, dermal, and inhalation exposure
	234	Know how to run field tests for atmospheric contamination
	250	Ability to run carbon monoxide field test
	257	Recognize agents causing disabilities
	258	Recognize conditions causing disabilities and accidents
	308	Know difference in requirements of cross infection control in nursing homes and hospitals
	309	Understand soiled laundry handling problems in institutions
2.30	206	Ability to recognize Norway Rat and Roof Rat
	227	Understand relationship between accident rate and housekeeping
2.28	26	Know the procedure to seal an abandoned well
	37	Know lagoon safety requirements
2.25	69	Know what a temperature inversion is
	75	Be able to name three air pollution control devices
	113	Know acceptable standards of noise levels for homes and industry
	114	Know the level of decibels that causes come permanent hearing loss
	120	Knowledge of the Floatation Process
	121	Knowledge of the Continuous Regeneration Process
	131	Understand standards of floor space and cubic air space for occupancy
	134	Know how to calculate the volume of water required per person
	136	Understand electrical, sewage, and water hookups in public campsites
	147	Understand definitions of epidemic, endemic, pandemic, sylvan and urban
	151	Understand reproduction and physiology of bacteria
	156	Know the general effects of light on bacteria.
	185	Understand relationship of cow herd health and human disease transmission
2.23	198	Know plumbing fixtures required in dwellings
	221	Know what decibel range hearing loss starts
	239	Understand hazards of continuous X-ray exposure

TABLE VI - Continued

CNF	Item No.	Item Description
2.23 (Cont'd)	265	Understand use of keys in insect identification
2.19	29	Ability to accomplish percolation tests
	50	Ability to recognize all stages of life cycles of disease vectors
2.17	70	Know the effects of meteorology and topography on air pollution
	72	Name the six pollutants specified in the Clean Air Act
	79	Know several deleterious effects of air pollution other than health effects
	109	Know principal sources of community noises
	111	Understand noise abatement methods
	115	Know the potential ways for increasing the usable water supply
	129	Knowledge of State Urban Water Supply and Sewerage Systems Act
	137	Ability to recognize adequate laundry facilities in migrant labor camps
	139	Know ratio of plumbing-fixtures-to-population of day camps
	148	Understand the relationship between wild animal population and rabies
2.16	184	Understand mastitis control
	270	Know how to calculate ppm and mix insecticides
2.15	201	Know window and skylight and/or artificial light required
	223	Understand occupational causes of hearing loss
	235	Understand radiation exposure
	236	Ability to use dosimeter and Geiger counter
	264	Have completed Red Cross First Aid Training
	290	Know T.B. and brucellosis control methods in dairy cattle
	298	Know water volume per bed and temperature standards for nursing homes
	301	Know methods of disinfecting operating rooms
	303	Understand proper location of air intake and exhaust systems
2.14	31	Ability to read sanitary plot maps and simple blueprints
	38	Know lagoon maintenance requirements
2.09	25	Ability to interpret water supply analysis reports
2.08	77	Know the Ringelmann System of defining visible air pollutants
	86	Understand the significance and control of leachate
	89	Ability to calculate volumes of refuse and cover material
	102	Ability to define decibels
	238	Know the significance of alpha, beta, and gamma exposure
	242	Know effect of radiation on living tissue
	253	Understand occupational diseases caused by harmful situations
	259	Know what safety devices are needed in a given situation
	261	Know which agents may effect the skin
	280	Know zoonosis indigenous to wild life of your area

TABLE VI - Continued

CNF	Item No.	Item Description
2.08 (Cont'd)	281	Know wild host animal of zoonosis in your area
	291	Know psittacosis control procedures
2.07	197	Ability to recognize adequate heating facilities
2.05	48	Ability to recognize noxious weeds
	58	Ability to evaluate location of vending machines
2.00	36	Ability to size lagoons to a given system
	127	Understand quality control methods in water treatment plants
	150	Understand the transmission of zoonosis
	153	Understand pasteurization, sanitation, and sterilization
	159	Know the term "Thermal Death Time"
	161	Ability to read and evaluate a flow diagram
	174	Be able to calculate and maneuver bathing load
	179	Understand use of vacuum chamber in odor and taste control
	181	Ability to take legal milk samples
	187	Know the significance of phosphatase in pasteurized milk
	188	Know farm storage milk temperature requirements
	260	Know which agents may cause respiratory disease
	271	Understand vector-borne disease transmission
	277	Understand water ponding control as a mosquito control tool
	278	Know the flight range of various mosquitos
	282	Know legal procedure to enforce local animal control code
	287	Ability to cooperate with Humane Society
	288	Know sanitary requirements for stockyards
	297	Know illumination standards for institutional kitchens
	300	Know and apply occupancy standards to all types of institutions
	302	Know acceptable methods of cleaning and disinfecting different kinds of floors
1.95	30	Know the relationship between soil types and effluent absorption
1.92	67	Know the primary gaseous components in the atmosphere
	68	Know what the adiabatic lapse rate is
	73	Know the local ambient air quality standards for each of the six pollutants
	84	Knowledge of acceptable roads within the landfill
	88	Ability to evaluate compaction equipment
	92	Estimate net weight on volume of loads
	101	Understand undesirable hearing changes as result of noise levels
	108	Knowledge of value of sound muffs
	126	Knowledge of the Zone of Aeration
	152	Understand the difference between aerobic and anaerobic bacteria
	157	Knowledge of intestinal nematodes
	165	Understand relationship of pH to chlorine
	166	Know recommended depth of diving area to height of diving board

TABLE VI - Continued

CNF	Item No.	Item Description
1.92 (Cont'd)	189	Know required contact times and strengths of various disinfectants
1.90	21	Understand spring development as a domestic water source
	32	Ability to design and size systems to fit existing conditions
1.85	241	Know who is responsible for disposal of radioactive waste
	243	Have ability to monitor radiation from X-ray machine
	246	Understand the term: Electron, Proton, Neutron
	247	Understand "half life" of an isotope
	263	Ability to evaluate an industrial hygiene problem
	292	Know epidemiological procedures for zoonosis
1.83	104	Knowledge of pressure level of noise
	105	Knowledge of frequency of noise
	106	Know what an ondimeter is
	112	Understand application of sound proofing buildings and offices
	177	Ability to check time and temperature on both HTST and Batch Pasteurizers
1.81	11	Ability to calculate volumes of water required at an installation
1.80	19	Know how to run a "yield and drawdown" test
1.77	244	Know fission from fusion
	254	Understand physiological distress due to agents in industrial atmosphere
	255	Understand abnormal stress due to improper work methods
1.75	80	Understand the relationship between air pollutants and allergies
	90	Ability to route pickup crews
	103	Ability to define frequencies in cycles per second
	107	Knowledge of acoustical or sound-absorbing walls
	180	Know how to calculate logarithmic average of bacterial counts
1.71	12	Ability to calculate peak load of a water system
1.69	240	Know acceptable disposal sites
1.67	13	Ability to size systems to meet load requirements
	118	Know how to study the flood characteristics of a stream
	158	Knowledge of Cestodes and Trematodes
1.61	237	Understand isotopic forms of elements
1.58	76	Be able to discuss the synergistic effect of particulate and sulfur dioxide
	91	Know maintenance procedures on equipment
	94	Knowledge of a Systems Analysis Concept
	95	Knowledge of Volume Reductions Systems
	122	Knowledge of removing fluorides from water

TABLE VI - Continued

CNF	Item No.	Item Description
1.48	45	Ability to recognize sex of animals and fowl
1.38	130	Understand and apply standards for semi-public water and sewage systems
1.33	46	Ability to estimate approximate age of fowl
	83	Ability to operate landfill equipment
	154	Knowledge of the Fluorescent Antibody Test

The Nebraska health department administrators as a survey population sub-group place 13 questionnaire items in the category of 2.80 or above. This is 4.2% of the questions asked on the questionaire. The highest CNF among these items is 2.95 - the ability to differentiate between sanitary and unsanitary conditions (#43), know proper use of pesticides (#269), good personal hygiene (#4), ability to recognize rodent harborages (#210), know standards for storage of materials to deter rodents (#211), know insects of public health importance (#267), ability to take legal water samples (#116), ability to sample chlorinated water (#128), ability to take legal swimming pool water samples (#163), ability to check water in the field for chlorine and pH (#170), recognize good personal hygiene (#65), knowledge of codes, laws, rules, and regulations pertaining to work (#1), and last, the ability to sample water supplies (#24).

The same population sub-group placed 14 items below the level of 2.00. This is 4.5% of the questions asked. Therefore, the Nebraska sanitarians indicate that in their opinion 4.5% of the questions on the survey instruments are not applicable to the sanitarian aides job competencies.

The data from the final sub-group of the study, the professional sanitarians in the State of Nebraska, is provided in Table VII. This population sub-group returned 59 questionnaires.

TABLE VII

COMPETENCY NEED FACTORS IN DECENDING ORDER
OF IMPORTANCE BY NEBRASKA SANITARIANS

CNF	Item No.	Item
2.90	191	Ability to recognize acceptable toilet facilities
	211	Know standards for storing materials to deter rodents
2.85	78	Know the various means used to monitor air pollution
	135	Understand vector control in camps
	138	Recognize cross connections between water and sewage systems
2.83	41	Ability to recognize public health aspects of a nuisance
	43	Ability to differentiate between sanitary and unsanitary conditions
2.82	40	Know the public health hazards of waste disposal system failure
2.80	125	Ability to define "potable water"
	163	Ability to take legal swimming pool water samples
	190	Ability to recognize acceptable kitchen facilities
	210	Ability to recognize rodent harborages
	218	Know necessity of rat watering points
	262	Know which state department is responsible in case of an industrial accident
	276	Ability to recognize mosquito breeding areas
	293	Know how to get samples in safe, legal manner
	294	Know modes of transmission for salmonella from pets to human
	296	Ability to recognize unclean conditions by sight and smell
2.79	4	Good personal hygiene
	65	Recognize good personal hygiene
2.78	1	Knowledge of codes, laws, rules and regulations pertaining to work
2.76	64	Recognize safe and unsafe food handling procedures
2.75	14	Ability to recognize need of disinfection
	60	Understand control of pests in food service establishments
	68	Know what the adiabatic lapse rate is
	96	Knowledge of vector control
	116	Ability to take legal water samples
	128	Ability to sample chlorinated water
	181	Ability to take legal milk samples
2.72	2	Ability with public relations and with public
	5	Dependable work habits
	62	Understand organisms in food service establishments
2.71	20	Know how to disinfect a water source and system
2.70	27	Know the public health hazards of a contaminated system
	75	Be able to name three air pollution control devices
	93	Know sanitary landfill standards

TABLE VII - Continued

CNF	Item No.	Item Description
2.70 (Cont'd)	124	Knowledge of the types of chemicals used for emergency chlorination
	153	Understand pasteurization, sanitation, and sterilization
	193	Ability to recognize acceptable bathing facilities
	194	Understand the definitions in the State Housing Code
	205	Know accepted safeguards for various poisons
	225	Know where protective clothing must be worn
	245	Ability to cooperate with Civil Defense Department in catastrophe
	249	Understand use of protective clothing and devices
	252	Know good housekeeping practices
	271	Understand vector-borne disease transmission
	273	Know materials in which flies will lay eggs
	283	Know proper procedures in a human rabies exposure
	305	Know when air gaps are required on plumbing fixtures
2.68	24	Ability to sample water supplies
	53	Ability to inspect eating and drinking establishments under applicable codes
	54	Ability to recognize cross connections in plumbing
	56	Understand sanitization of multi-use utensils
2.67	17	Ability to recognize cross connections
2.65	61	Recognize hazardous chemicals and know their uses
	188	Know farm storage milk temperature requirements
2.64	18	Know the sanitary precautions for each type of well
	33	Ability to inspect existing systems
2.62	7	Understand methods of gathering and preserving evidence
	47	Know the procedures in processing citizen-initiated complaints
	63	Recognize acceptable refrigeration facilities
2.60	87	Know proper compaction and cover procedures
	119	Knowledge of techniques used to treat water
	149	Understand dog and cat control ordinances used in human rabies cases
	160	Know the meaning of "High-free Residual Chlorine"
	165	Understand relationship of pH to chlorine
	171	Ability to run field test for chlorine and pH
	192	Ability to recognize acceptable sleeping facilities
	197	Ability to recognize adequate heating facilities
	198	Know plumbing fixtures required in dwellings
	200	Know meaning of deteriorated and dilapidated
	201	Know window and skylight and/or artificial light required
	207	Know effective rat proofing methods
	220	Know where IOSHA Laws apply and where local department has responsibility

TABLE VII - Continued

CNF	Item No.	Item Description
2.60 (Cont'd)	226	Know when safety equipment must be readily available
	227	Understand relationship between accident rate and housekeeping
	236	Ability to use dosimeter and Geiger counter
	272	Know intermediate hosts of insects of public health importance
	274	Know sanitary storage methods of insect breeding materials
	275	Know mosquito control methods
	277	Understand water ponding control as a mosquito control tool
	285	Know evidence of lack of sanitary manure storage
2.58	59	Ability to evaluate cleanliness of vending machines
2.57	3	Ability to write meaningful and intelligent reports
	23	Know the possible routes of contamination in each type of well
2.55	57	Recognize acceptable single service utensils
	109	Know principal sources of community noises
	146	Know the mode of transmission of vector-borne diseases
	164	Understand algae control
	173	Understand use of chlorine, alum and soda ash
	186	Know the significance of coliform bacteria in pasteurized milk
2.53	16	Ability to recognize different types of wells
	39	Ability to recognize system failure
2.52	10	Ability to cooperate and work with other departments and agencies
	42	Ability to assist pet owners in fly, rodent, and odor control
2.50	34	Ability to recognize acceptable installation
	99	Understand community-wide solid waste control methods
	110	Understand noise prevention methods
	114	Know the level of decibels that causes some permanent hearing loss
	123	Ability to do a sanitary survey of water supply
	152	Understand the difference between aerobic and anaerobic bacteria
	172	Know requirements of safety equipment
	199	Know regulations relative to handrails on steps
	203	Know rat proofing methods
	206	Ability to recognize Norway Rat and Roof Rat
	212	Ability to recognize restricted substances by name
	235	Understand radiation exposure
	239	Understand hazards of continuous X-ray exposure
	241	Know who is responsible for disposal of radioactive waste
	269	Know proper use of insecticides
	279	Know naturalistic mosquito abatement methods
	287	Ability to cooperate with Humane Society

TABLE VII - Continued

CNF	Item No.	Item Description
2.50 (Cont'd)	304	Know proper handling methods of soiled mops
2.48	51	Understand the S.N.F. standards relative to food service equipment
	52	Ability to run field tests on dishwashing machines and sanitizing solutions
2.46	22	Ability to inspect and recognize each type of well construction
2.45	99	Understand community-wide solid waste control methods
	111	Understand noise abatement methods
	162	Know cause of mud ball in filters
	169	Understand recirculation systems
	182	Understand application of the "holding tube"
2.44	26	Know the procedure to seal an abandoned well
2.43	15	Ability to run field test for disinfectant residual
2.40	71	Name five major sources of air pollution
	72	Name the six pollutants specified in the Clean Air Act
	82	Knowledge of soils
	85	Know how to control blow paper
	98	Know refuse control measure at camps and transient lodging facilities
	113	Know acceptable standards of noise levels for homes and industry
	117	Know the functions of a reservoir
	121	Knowledge of the Continuous Regeneration Process
	177	Ability to check time and temperature on both HTST and Batch Pasteurizers
	185	Understand relationship of cow herd health and human disease transmission
	187	Know the significance of phosphatase in pasteurized milk
	204	Know density and space requirements
	208	Know diseases spread by rodents to man
	214	Know tracking powders and how to use them
	215	Know how various diseases are transmitted from rodents to man
	228	Know "adequate toilet facilities" for number of employees
	229	Know where eating and smoking areas are located in a plant
	232	Know significance of oral, dermal, and inhalation exposure
	238	Know the significance of alpha, beta, and gamma exposure
	246	Understand the term: Electron, Proton, Neutron
	250	Ability to run carbon monoxide field test
	251	Ability to recognize dangerous situations in industrial plants
	265	Understand use of keys in insect identification
	266	Know major disease spread to man by insect
	282	Know legal procedure to enforce local animal control code
	284	Know local requirements for restrictions of numbers of animals
	286	Understand acceptable animal feed storage
	288	Know sanitary requirements for stockyards
	292	Know epidemiological procedures for zoonosis
	295	Know the route of infection transmission in nursing homes
	297	Know illumination standards for institutional kitchens

TABLE VII - Continued

CNF	Item No.	Item Description
2.40 (Cont'd)	302	Know acceptable methods of cleaning and disinfecting different kinds of floors
	303	Understand proper location of air intake and exhaust systems
	308	Know difference in requirements of cross infection control in nursing homes and hospitals
	309	Understand soiled laundry handling problems in institutions
2.39	6	Knowledge of the professional jargon of the discipline
2.38	8	Knowledge of enforcement procedures
2.36	28	Know and have the ability to apply standards to privies
2.35	66	Be able to define air pollution
	74	Know three respiratory diseases that tend to be aggravated by air pollution
	77	Know the Ringelmann System of defining visible air pollutants
	100	Understand definition of noise as compared to sound
	130	Understand and apply standards for semi-public water and sewage systems
	137	Ability to recognize adequate laundry facilities in migrant labor camps
	148	Understand the relationship between wild animal population and rabies
	167	Know diseases usually associated with natural bathing places
2.34	44	Know areas of a community which exclude specific classes of animals by zoning
2.30	81	Understand air pollution warnings, alerts and emergencies
	131	Understand standards of floor space and cubic air space for occupancy
	139	Know ratio of plumbing-fixtures-to-population of day camps
	145	Know the reservoir of communicable disease endemic to the area
	166	Know recommended depth of diving area to height of diving board
	189	Know required contact times and strengths of various disinfectants
	202	Know toxic paint and toxic preservative materials
	209	Know house mouse control methods
	221	Know what decibel range hearing loss starts
	224	Know relationship between duration of noise exposure and decibel level.
	247	Understand "half life" of an isotope
	248	Know what to do in case of a radioactive spill
	256	Ability to work with plant safety officer
	258	Recognize conditions causing disabilities and accidents
	260	Know which agents may cause respiratory disease
	268	Know life cycles of insects of public health importance
	299	Know proper use of pesticides in all types of institutions
	306	Know sanitary methods of disposal of dressings and laboratory cultures
	307	Know cleaning methods of refuse chutes and dumbwaiters

TABLE VII - Continued

CNF	Item No.	Item Description
2.25	35	Know the basis of lagoon operation
	70	Know the effects of meteorology and topography on air pollution
	132	Ability to apply sanitary standards to migratory labor camps
	142	Understand and be able to explain use of pesticides in camps
	144	Recognize type and application of fire extinguishers
	147	Understand definitions of epidemic, endemic, pandemic, sylvan and urban
	155	Knowledge of active and passive immunity
2.24	9	Ability to be a court witness
2.22	25	Ability to interpret water supply analysis reports
2.21	29	Ability to accomplish percolation tests
	38	Know lagoon maintenance requirements
2.20	69	Know what a temperature inversion is
	79	Know several deleterious effects of air pollution other than health effects
	101	Understand undesirable hearing changes as result of noise levels
	140	Know space requirements for outdoor campsites
	143	Ability to recognize fire safety hazards in motels and hotels
	161	Ability to read and evaluate a flow diagram
	183	Know the differential in pressure of raw and pasteurized milk in HTST units
	213	Ability to estimate size of rodent population
	217	Know how to mix rodent baits
	222	Know the definition of noise
	230	Know what "threshold limit values" are for toxic chemicals
	231	Understand metric system of measurements
	233	Know what protective clothing is required in dusty conditions
	240	Know acceptable disposal sites
	243	Have ability to monitor radiation from X-ray machine
	253	Understand occupational diseases caused by harmful situations
	259	Know what safety devices are needed in a given situation
	281	Know wild host animal of zoonosis in your area
	289	Know how to handle a rabid animal
2.18	37	Know lagoon safety requirements
2.15	31	Ability to read sanitary plot maps and simple blueprints
	67	Know the primary gaseous components in the atmosphere
	105	Knowledge of frequency of noise
	127	Understand quality control methods in water treatment plants
	150	Understand the transmission of zoonosis
	159	Know the term "Thermal Death Time"
	176	Know how to operate a HTST flow diversion valve
	184	Understand mastitis control
2.14	49	Know proper use of herbicides and pesticides in nuisance control

TABLE VII - Continued

CNF	Item No.	Item Description
2.10	115	Know the potential ways for increasing the usable water supply
	219	Understand fumigant methods
	223	Understand occupational causes of hearing loss
	237	Understand isotopic forms of elements
	242	Know effect of radiation on living tissue
	244	Know fission from fusion
	263	Ability to evaluate an industrial hygiene problem
	264	Have completed Red Cross First Aid Training
	270	Know how to calculate ppm and mix insecticides
	278	Know the flight range of various mosquitos
	300	Know and apply occupancy standards to all types of institutions
2.07	21	Understand spring development as a domestic water source
2.05	73	Know the local ambient air quality standards for each of the six pollutants
	80	Understand the relationship between air pollutants and allergies
	104	Knowledge of pressure level of noise
	107	Knowledge of acoustical or sound-absorbing walls
	175	Know how to check a leak protector valve
2.03	58	Ability to evaluate location of vending machines
2.02	30	Know the relationship between soil types and effluent absorption
2.00	86	Understand the significance and control of leachate
	102	Ability to define decibels
	103	Ability to define frequencies in cycles per second
	106	Know what an ondimeter is
	126	Knowledge of the Zone of Aeration
	133	Recognize health hazards at summer camps
	151	Understand reproduction and physiology of bacteria
	179	Understand use of vacuum chamber in odor and taste control
	195	Know the responsibilities of owners of dwelling
	216	Ability to estimate age of rodent signs
	257	Recognize agents causing disabilities
	267	Know insects of public health importance
	280	Know zoonosis indigenous to wild life of your area
1.96	50	Ability to recognize all stages of life cycles of disease vectors
1.95	112	Understand application of sound proofing buildings and offices
	170	Ability to interpret analysis results
1.93	19	Know how to run a "yield and drawdown" test
	32	Ability to design and size systems to fit existing conditions
1.90	120	Knowledge of the Floatation Process
	136	Understand electrical, sewage, and water hookups in public campsites
	174	Be able to calculate and maneuver bathing load

TABLE VII - Continued

CNF	Item No.	Item Description
1.90 (Cont'd)	196	Know the responsibilities of occupants of dwelling
	234	Know how to run field tests for atmospheric contamination
	254	Understand physiological distress due to agents in industrial atmosphere
	291	Know psittacosis control procedures
	301	Know methods of disinfecting operating rooms
1.85	89	Ability to calculate volumes of refuse and cover material
	118	Know how to study the flood characteristics of a stream
	141	Understand fire regulations and standards
	168	Understand bacterial standards and their application
1.83	48	Ability to recognize noxious weeds
1.80	108	Knowledge of value of sound muffs
	122	Knowledge of removing fluorides from water
	158	Knowledge of Cestodes and Trematodes
	261	Know which agents may effect the skin
	290	Know T.B. and brucellosis control methods in dairy cattle
	298	Know water volume per bed and temperature standards for nursing homes
1.75	84	Knowledge of acceptable roads within the landfill
1.70	76	Be able to discuss the synergistic effect of particulate and sulfur dioxide
	134	Know how to calculate the volume of water required per person
	255	Understand abnormal stress due to improper work methods
1.65	88	Ability to evaluate compaction equipment
	95	Knowledge of Volume Reductions Systems
	157	Knowledge of intestinal nematodes
	180	Know how to calculate logarithmic average of bacterial counts
1.64	11	Ability to calculate volumes of water required at an installation
1.62	55	Ability to size kitchen ventilation systems
1.61	13	Ability to size systems to meet load requirements
1.60	36	Ability to size lagoons to a given system
	154	Knowledge of the Fluorescent Antibody Test
1.57	12	Ability to calculate peak load of a water system
	45	Ability to recognize sex of animals and fowl
1.55	90	Ability to route pickup crews
	92	Estimate net weight on volume of loads
	94	Knowledge of a Systems Analysis Concept
	129	Knowledge of State Urban Water Supply and Sewerage Systems Act

TABLE VII - Continued

CNF	Item No.	Item Description	CNF	Item No.	Item Description
1.50	156	Know the general effects of light on bacteria	1.30	178	Know bacterial and chemical standards for both raw and pasteurized milk
1.32	46	Ability to estimate approximate age of fowl	1.25	83	Ability to operate landfill equipment
				91	Know maintenance procedures on equipment

The most important items to the Nebraska sanitarians had a CNF of 2.90. They are items: (#191) ability to recognize acceptable toilet facilities, (#211) know standards for storage of materials to deter rodents. This survey population sub-group placed 18 or 5.8% of the competencies on the survey instruments in the category above 2.80. This same survey population sub-group gave a CNF of less than 2.00 to 48 items included in the survey. This equals 15% of the 309 questions on the survey instruments.

Table VIII provides the reader with an item-by-item CNF comparison between the total Iowa and total Nebraska populations. The left column gives the item number. The second column gives the competency need factor of each item for Iowa and the third column gives the Nebraska competency need factor. The fourth column gives a brief description of the survey item.

TABLE VIII

A SURVEY ITEM COMPARISON OF
COMPETENCY NEED FACTORS BETWEEN
THE IOWA AND NEBRASKA RESPONDENTS

Item No.	IOWA CNF	NEBR. CNF	Item Description
1	2.82	2.80	Knowledge of codes, laws, rules and regulations pertaining to work
2	2.83	2.78	Ability with public relations and with public
3	2.68	2.61	Ability to write meaningful and intelligent reports
4	2.83	2.84	Good personal hygiene
5	2.81	2.74	Dependable work habits
6	2.55	2.37	Knowledge of the professional jargon of the discipline
7	2.63	2.62	Understand methods of gathering and preserving evidence
8	2.48	2.40	Knowledge of enforcement procedures
9	2.42	2.32	Ability to be a court witness
10	2.68	2.57	Ability to cooperate and work with other departments and agencies
11	2.05	1.71	Ability to calculate volumes of water required at an installation
12	2.02	1.65	Ability to calculate peak load of a water system
13	1.97	1.63	Ability to size systems to meet load requirements
14	2.77	2.76	Ability to recognize need of disinfection
15	2.64	2.47	Ability to run field test for disinfectant residual
16	2.68	2.61	Ability to recognize different types of wells
17	2.69	2.65	Ability to recognize cross connections
18	2.75	2.65	Know the sanitary precautions for each type of well
19	1.96	1.88	Know how to run a "yield and drawdown" test
20	1.96	2.59	Know how to disinfect a water source and system

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
21	2.10	2.00	Understand spring development as a domestic water source
22	2.66	2.53	Ability to inspect and recognize each type of well construction
23	2.75	2.65	Know the possible routes of contamination in each type of well
24	2.82	2.73	Ability to sample water supplies
25	2.53	2.16	Ability to interpret water supply anaylsis reports
26	2.63	2.38	Know the procedure to seal an abandoned well
27	2.83	2.71	Know the public health hazards of a contaminated system
28	2.63	1.73	Know and have the ability to apply standards to privies
29	2.65	2.20	Ability to accomplish percolation tests
30	2.54	2.00	Know the relationship between soil types and effluent absorption
31	2.44	2.15	Ability to read sanitary plot maps and simple blueprints
32	2.34	1.92	Ability to design and size systems to fit existing conditions
33	2.82	2.59	Ability to inspect existing systems
34	2.85	2.57	Ability to recognize acceptable installation
35	2.45	2.29	Know the basis of lagoon operation
36	2.07	1.63	Ability to size lagoons to a given system
37	2.41	2.22	Know lagoon safety requirements
38	2.48	2.18	Know lagoon maintenance requirements
39	2.79	2.53	Ability to recognize system failure
40	2.85	2.84	Know the public health hazards of waste disposal system failure
41	2.81	2.80	Ability to recognize public health aspects of a nuisance
42	2.54	2.56	Ability to assist pet owners in fly, rodent, and odor control
43	2.88	2.88	Ability to differentiate between sanitary and unsanitary conditions

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
44	2.24	2.32	Know areas of a community which exclude specific classes of animals by zoning
45	1.57	1.50	Ability to recognize sex of animals and fowl
46	1.42	1.33	Ability to estimate approximate age of fowl
47	2.64	2.64	Know the procedures in processing citizen-initiated complaints
48	2.12	1.92	Ability to recognize noxious weeds
49	2.44	2.29	Know proper use of herbicides and pesticides in nuisance control
50	2.19	2.10	Ability to recognize all stages of life cycles of disease vectors
51	2.54	2.44	Understand the S.N.F. standards relative to food service equipment
52	1.80	2.42	Ability to run field tests on dishwashing machines and sanitizing solutions
53	2.73	2.68	Ability to inspect eating and drinking establishments under applicable codes
54	2.63	2.66	Ability to recognize cross connections in plumbing
55	1.99	1.60	Ability to size kitchen ventilation systems
56	2.64	2.72	Understand sanitization of multi-use utensils
57	2.67	2.64	Recognize acceptable single service utensils
58	1.63	2.04	Ability to evaluate location of vending machines
59	2.58	2.58	Ability to evaluate cleanliness of vending machines
60	2.73	2.76	Understand control of pests in food service establishments
61	2.62	2.60	Recognize hazardous chemicals and know their uses
62	2.73	2.66	Understand the control of pathogenic organisms in food food service establishments
63	2.73	2.60	Recognize acceptable refrigeration facilities

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
64	2.78	2.74	Recognize safe and unsafe food handling procedures
65	2.74	2.80	Recognize good personal hygiene
66	2.35	2.34	Be able to define air pollution
67	2.01	2.06	Know the primary gaseous components in the atmosphere
68	1.91	2.44	Know what the adiabatic lapse rate is
69	2.16	2.22	Know what a temperature inversion is
70	2.23	2.22	Know the effects of meteorology and topography on air pollution
71	2.44	2.41	Name the five major sources of air pollution
72	2.32	2.31	Name the six pollutants specified in the Clean Air Act
73	2.25	2.00	Know the local ambient air quality standards for each of the six pollutants
74	2.30	2.34	Know three respiratory diseases that tend to be aggravated by air pollution
75	2.31	2.53	Be able to name three air pollution control devices
76	1.94	1.66	Be able to discuss the synergistic effect of particulate and sulfur dioxide
77	2.11	2.25	Know the Ringelmann System of defining visible air pollutants
78	2.37	2.69	Know the various means used to monitor air pollution
79	2.21	2.19	Know several deleterious effects of air pollution other than health effects
80	2.06	1.94	Understand the relationship between air pollutants and allergies
81	2.44	2.34	Understand air pollution warnings, alerts and emergencies
82	2.29	2.38	Knowledge of soils
83	1.56	1.28	Ability to operate landfill equipment

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
84	2.04	1.81	Knowledge of acceptable roads within the landfill
85	2.46	2.47	Know how to control blow paper
86	2.24	2.03	Understand the significance and control of leachate
87	2.54	2.66	Know proper compaction and cover procedures
88	1.95	1.75	Ability to evaluate compaction equipment
89	2.07	1.94	Ability to calculate volumes of refuse and cover material
90	1.64	1.63	Ability to route pickup crews
91	1.47	1.38	Know maintenance procedures on equipment
92	1.82	1.69	Estimate net weight on volume of loads
93	2.61	2.72	Know sanitary landfill standards
94	1.85	1.56	Knowledge of a Systems Analysis Concept
95	1.83	1.63	Knowledge of Volume Reductions Systems
96	2.44	2.75	Knowledge of vector control
97	2.38	2.47	Knowledge of sanitation at a transfer station
98	2.43	2.50	Know refuse control measure at camps and transient lodging facilities
99	2.52	2.50	Understand community-wide solid waste control methods
100	2.36	2.34	Understand definition of noise as compared to sound
101	2.17	2.09	Understand undesirable hearing changes as result of noise levels
102	2.24	2.38	Ability to define decibels
103	1.98	1.94	Ability to define frequencies in cycles per second
104	2.01	2.06	Knowledge of pressure level of noise
105	2.03	2.03	Knowledge of frequency of noise
106	2.05	1.94	Know what an ondimeter is
107	2.10	1.94	Knowledge of acoustical or sound-absorbing walls

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
108	2.24	1.84	Knowledge of value of sound muffs
109	2.33	2.41	Know principal sources of community noises
110	2.31	2.49	Understand noise prevention methods
111	2.29	2.36	Understand noise abatement methods
112	2.12	1.91	Understand application of sound proofing buildings and offices
113	2.26	2.34	Know acceptable standards of noise levels for homes and industry
114	2.43	2.41	Know the level of decibels that causes some permanent hearing loss
115	2.29	2.13	Know the potential ways for increasing the usable water supply
116	2.79	2.78	Ability to take legal water samples
117	2.43	2.38	Know the functions of a reservoir
118	2.02	1.78	Know how to study the flood characteristics of a stream
119	2.58	2.56	Knowledge of techniques used to treat water
120	2.16	2.03	Knowledge of the Floatation Process
121	2.16	2.34	Knowledge of the Continuous Regeneration Process
122	2.09	1.72	Knowledge of removing fluorides from water
123	2.52	2.22	Ability to do a sanitary survey of water supply
124	2.66	2.72	Knowledge of the types of chemicals used for emergency chlorination
125	2.60	2.72	Ability to define "potable water"
126	2.25	1.97	Knowledge of the Zone of Aeration
127	2.33	2.09	Understand quality control methods in water treatment plants
128	2.72	2.78	Ability to sample chlorinated water

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
129	2.29	2.22	Knowledge of State Urban Water Supply and Sewerage Systems Act
130	2.60	2.38	Understand and apply standards for semi-public water and sewage systems
131	2.35	2.28	Understand standards of floor space and cubic air space for occupancy
132	2.46	2.28	Ability to apply sanitary standards to migratory labor camps
133	2.68	2.28	Recognize health hazards at summer camps
134	2.27	2.28	Know how to calculate the volume of water required per person
135	2.56	2.75	Understand vector control in camps
136	2.46	2.03	Understand electrical, sewage, and water hookups in public campsites
137	2.35	2.28	Ability to recognize adequate laundry facilities in migrant labor camps
138	2.75	2.75	Recognize cross connections between water and sewage systems
139	2.29	2.25	Know ratio of plumbing-fixtures-to-population of day camps
140	2.24	2.34	Know space requirements for outdoor campsites
141	2.38	2.03	Understand fire regulations and standards
142	2.51	2.38	Understand and be able to explain use of pesticides in camps
143	2.39	2.47	Ability to recognize fire safety hazards in motels and hotels
144	2.43	2.31	Recognize type and application of fire extinguishers
145	2.36	2.38	Know the reservoir of communicable disease endemic to the area
146	2.47	2.59	Know the mode of transmission of vector-borne diseases
147	2.37	2.25	Understand definitions of epidemic, endemic, pandemic, sylvan and urban
148	2.38	2.28	Understand the relationship between wild animal population and rabies

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
149	2.48	2.53	Understand dog and cat control ordinances used in human rabies cases
150	2.21	2.09	Understand the transmission of zoonosis
151	2.20	2.16	Understand reproduction and physiology of bacteria
152	2.39	2.28	Understand the difference between aerobic and anaerobic bacteria
153	2.57	2.44	Understand pasteurization, sanitation, and sterilization
154	1.92	1.50	Knowledge of the Fluorescent Antibody Test
155	2.11	2.28	Knowledge of active and passive immunity
156	2.16	1.78	Know the general effects of light on bacteria
157	2.06	1.78	Knowledge of intestinal nematodes
158	2.02	1.75	Knowledge of Cestodes and Trematodes
159	2.16	2.00	Know the term "Thermal Death Time"
160	2.55	2.56	Know the meaning of "High-free Residual Chlorine"
161	2.35	2.13	Ability to read and evaluate a flow diagram
162	2.27	2.53	Know cause of mud ball in filters
163	2.72	2.81	Ability to take legal swimming pool water samples
164	2.60	2.50	Understand algae control
165	2.61	2.34	Understand relationship of pH to chlorine
166	2.23	2.16	Know recommended depth of diving area to height of diving board
167	2.42	2.34	Know diseases usually associated with natural bathing places
168	2.42	2.06	Understand bacterial standards and their application
169	2.39	2.40	Understand recirculation systems
170	2.42	2.09	Ability to interpret analysis results
171	2.67	2.69	Ability to run field tests for chlorine and pH
172	2.39	2.59	Know requirements of safety equipment

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
173	2.56	2.59	Understand use of chlorine, alum and soda ash
174	2.06	2.03	Be able to calculate and maneuver bathing load
175	2.16	2.18	Know how to check a leak protector valve
176	2.00	2.25	Know how to operate a HTST flow diversion valve
177	2.23	2.19	Ability to check time and temperature on both HTST and Batch Pasteurizers
178	2.40	2.13	Know bacterial and chemical standards for both raw and pasteurized milk
179	2.07	2.00	Understand use of vacuum chamber in odor and taste control
180	1.91	1.69	Know how to calculate logarithmic average of bacterial counts
181	2.50	2.47	Ability to take legal milk samples
182	2.12	2.47	Understand application of the "holding tube"
183	2.14	2.25	Know the differential in pressure of raw and pasteurized milk in HTST units
184	2.15	2.16	Understand mastitis control
185	2.37	2.34	Understand relationship of cow herd health and human disease transmission
186	2.42	2.56	Know the significance of coliform bacteria in pasteurized milk
187	2.30	2.25	Know the significance of phosphatase in pasteurized milk
188	2.45	2.41	Know farm storage milk temperature requirements
189	2.37	2.16	Know required contact times and strengths of various disinfectants
190	2.58	2.70	Ability to recognize acceptable kitchen facilities
191	2.75	2.78	Ability to recognize acceptable toilet facilities
192	2.43	2.56	Ability to recognize acceptable sleeping facilities

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
193	2.62	2.61	Ability to recognize acceptable bathing facilities
194	2.57	2.52	Understand the definitions in the State Housing Code
195	2.48	2.22	Know the responsibilities of owners of dwelling
196	2.49	2.30	Know the responsibilities of occupants of dwelling
197	2.38	2.36	Ability to recognize adequate heating facilities
198	2.52	2.39	Know plumbing fixtures required in dwellings
199	2.38	2.39	Know regulations relative to handrails on steps
200	2.45	2.43	Know meaning of deteriorated and dilapidated
201	2.26	2.35	Know window and skylight and/or artificial light required
202	2.42	2.30	Know toxic paint and toxic preservative materials
203	2.56	2.65	Know rat proofing methods
204	2.27	2.35	Know density and space requirements
205	2.71	2.74	Know accepted safeguards for various poisons
206	2.20	2.39	Ability to recognize Norway Rat and Roof Rat
207	2.53	2.70	Know effective rat proofing methods
208	2.45	2.39	Know diseases spread by rodents to man
209	2.47	2.57	Know house mouse control methods
210	2.67	2.39	Ability to recognize rodent harborages
211	2.58	2.78	Know standards for storing materials to deter rodents
212	2.41	2.43	Ability to recognize restricted substances by name
213	2.14	2.30	Ability to estimate size of rodent population
214	2.24	2.39	Know tracking powders and how to use them
215	2.38	2.35	Know how various diseases are transmitted from rodents to man

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
216	2.19	2.17	Ability to estimate age of rodent signs
217	2.25	2.43	Know how to mix rodent baits
218	2.36	2.30	Know necessity of rat watering points
219	2.33	2.22	Understand fumigant methods
220	2.30	2.52	Know where IOSHA Laws apply and where local department has responsibility
221	2.25	2.26	Know what decibel range hearing loss starts
222	2.25	2.30	Know the definition of noise
223	2.24	2.13	Understand occupational causes of hearing loss
224	2.18	2.43	Know relationship between duration of noise exposure and decibel level
225	2.45	2.57	Know where protective clothing must be worn
226	2.45	2.57	Know when safety equipment must be readily available
227	2.13	2.43	Understand relationship between accident rate and housekeeping
228	2.38	2.48	Know "adequate toilet facilities" for number of employees
229	2.26	2.43	Know where eating and smoking areas are located in a plant
230	2.26	2.30	Know what "threshold limit values" are for toxic chemicals
231	2.02	2.26	Understand metric system of measurements
232	2.25	2.35	Know significance of oral, dermal, and inhalation exposure
233	2.27	2.35	Know what protective clothing is required in dusty conditions
234	2.05	2.13	Know how to run field tests for atmospheric contamination
235	2.25	2.30	Understand radiation exposure
236	2.06	2.35	Ability to use dosimeter and Geiger counter
237	1.84	2.04	Understand isotopic forms of elements
238	2.10	2.35	Know the significance of alpha, beta, and gamma exposure

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
239	2.27	2.35	Understand hazards of continuous X-ray exposure
240	2.11	1.91	Know acceptable disposal sites
241	2.14	2.13	Know who is responsible for disposal of radioactive waste
242	2.16	2.09	Know effect of radiation on living tissue
243	1.97	2.00	Have ability to monitor radiation from X-ray machine
244	1.97	1.78	Know fission from fusion
245	2.38	2.52	Ability to cooperate with Civil Defense Department in catastrophe
246	2.06	2.09	Understand the term: Electron, Proton, Neutron
247	2.02	2.04	Understand "half life" of an isotope
248	2.30	2.13	Know what to do in case of a radioactive spill
249	2.27	2.57	Understand use of protective clothing and devices
250	2.34	2.35	Ability to run carbon monoxide field test
251	2.57	2.39	Ability to recognize dangerous situations in industrial plants
252	2.51	2.74	Know good housekeeping practices
253	2.35	1.74	Understand occupational diseases caused by harmful situations
254	2.19	1.83	Understand physiological distress due to agents in industrial atmosphere
255	2.17	1.74	Understand abnormal stress due to improper work methods
256	2.47	2.35	Ability to work with plant safety officer
257	2.39	2.17	Recognize agents causing disabilities
258	2.47	2.30	Recognize conditions causing disabilities and accidents
259	2.36	2.13	Know what safety devices are needed in a given situation
260	2.41	2.13	Know which agents may cause respiratory disease

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
261	2.38	2.35	Know which agents may affect the skin
262	2.46	2.70	Know which state department is responsible in case of an industrial accident
263	2.14	1.96	Ability to evaluate an industrial hygiene problem
264	2.37	2.13	Have completed Red Cross First Aid Training
265	2.10	2.30	Understand use of keys in insect identification
266	2.42	2.52	Know major disease spread to man by insect
267	2.57	2.87	Know insects of public health importance
268	2.30	1.96	Know life cycles of insects of public health importance
269	2.58	2.65	Know proper use of insecticides
270	2.32	2.04	Know how to calculate ppm and mix insecticides
271	2.37	2.52	Understand vector-borne disease transmission
272	2.43	2.57	Know intermediate hosts of insects of public health importance
273	2.56	2.61	Know materials in which flies will lay eggs
274	2.56	2.35	Know sanitary storage methods of insect breeding materials
275	2.61	2.30	Know mosquito control methods
276	2.65	2.70	Ability to recognize mosquito breeding areas
277	2.47	2.62	Understand water ponding control as a mosquito control tool
278	2.17	2.26	Know the flight range of various mosquitos
279	2.32	2.48	Know naturalistic mosquito abatement methods
280	2.14	2.04	Know zoonosis indigenous to wild life of your area
281	2.18	2.13	Know wild host animal of zoonosis in your area
282	2.37	2.39	Know legal procedure to enforce local animal control code
283	2.60	2.65	Know proper procedures in a human rabies exposure
284	2.29	2.43	Know local requirements for restrictions of numbers of animals

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
285	2.43	2.70	Know evidence of lack of sanitary manure storage
286	2.16	2.43	Understand acceptable animal feed storage
287	2.52	2.43	Ability to cooperate with Humane Society
288	2.19	2.39	Know sanitary requirements for stockyards
289	2.55	2.48	Know how to handle a rabid animal
290	2.01	2.00	Know T.B. and brucellosis control methods in dairy cattle
291	1.92	2.00	Know psittacosis control procedures
292	2.06	2.08	Know epidemiological procedures for zoonosis
293	2.56	2.74	Know how to get samples in safe, legal manner
294	2.42	2.60	Know modes of transmission for salmonella from pets to human
295	2.42	2.43	Know the route of infection transmission in nursing homes
296	2.62	2.87	Ability to recognize unclean conditions by sight and smell
297	2.16	2.52	Know illumination standards for institutional kitchens
298	2.07	2.04	Know water volume per bed and temperature standards for nursing homes
299	2.34	2.43	Know proper use of pesticides in all types of institutions
300	2.06	2.26	Know and apply occupancy standards to all types of institutions
301	1.96	2.04	Know methods of disinfecting operating rooms
302	2.20	2.52	Know acceptable methods of cleaning and disinfecting different kinds of floors
303	2.18	2.26	Understand proper location of air intake and exhaust systems
304	2.26	2.48	Know proper handling methods of soiled mops
305	2.27	2.57	Know when air gaps are required on plumbing fixtures

TABLE VIII - Continued

Item No.	IOWA CNF	NEBR. CNF	Item Description
306	2.30	2.43	Know sanitary methods of disposal of dressings and laboratory cultures
307	2.24	2.39	Know cleaning methods of refuse chutes and dumbwaiters
308	2.20	2.39	Know difference in requirements of cross infection control in nursing homes and hospitals
309	2.21	2.35	Understand soiled laundry handling problems in institutions

The interesting facts displayed in Table VIII are the similarities in the CNF's of most items. In evaluating 38 of the items, the two states have not agreed, one state placing the CNF in the "Highly Necessary" (above 2.50) range and the other state placing the CNF in the "Desirable" (2.00-2.49) range. The ratings of 32 other items were similarly split between the "Desirable" (2.00-2.49) range and "Not Applicable" (below 2.00) range. One item (#28) which Iowa has said is "Highly Necessary" is the ability to apply sanitary standards to privies while Nebraska has indicated this is a "Not Applicable" item. While there may be many reasons for this particular difference, the writer's conclusion is that most of the Nebraska public health professionals were found in the metropolitan areas where privies are illegal while much of Iowa's population is rural where privies are legal and county sanitarians must know the standards they must meet.

CHAPTER V

SUMMARY

The principal objective of this study was to identify the competencies required of a sanitarian aide to work effectively in the field of environmental health. For purposes of this study, the job description for a sanitarian aide as stated in the Dictionary of Occupational Titles was used as a reference to the general duties established for the position.

In the survey of literature, the writer could find no studies which had been conducted relative to the competency needs of a sanitarian aide. The writer's search included both a study of the references in college libraries and extensive correspondence with Schools of Public Health and Environmental Science.

The survey population of the study was 250 professional environmental personnel of Iowa and Nebraska. This population was surveyed by means of three specially-constructed questionnaires which had been previously field tested. To analyze the data, the three possible survey item responses were assigned numerical values as follows: Very Necessary - 3; Desirable - 2; Not Applicable - 1. A mean was computed for each item which is designated in this study as the Competency Need Factor (CNF). Usable data were received from 41" returned, usable questionnaires. This represented a return of 55.97 percent for the total research project.

The writer has designated each survey item with a CNF of 2.50 and above as a "very necessary" competency for a sanitarian aide. A survey item with

a CNF of between 2.00 and 2.50 has been designated as a "desirable" competency. An item with a CNF of less than 2.00 has been designated "not applicable" to the sanitarian aide's training.

The amassed data from all the respondents indicate that 85 competencies are important enough to be included in a curriculum for sanitarian aides, 196 others should be included in the curriculum, and 28 should not be included in his training program.

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APPENDIX A

TWO YEAR CURRICULUM
ENVIRONMENTAL HEALTH TECHNICIANS

TWO YEAR CURRICULUM
ENVIRONMENTAL HEALTH TECHNICIANS

A CONFERENCE REPORT

ATLANTA, GEORGIA

MAY 27 AND 28, 1970

Conducted by the National Environmental Health Association under Contract No. PLC-70-5 from the Environmental Health Service, Public Health Service, Department of Health, Education and Welfare

INTRODUCTION

A conference on the education and training of environmental health technicians was held by the National Environmental Health Association on May 27 and 28, 1970 in Atlanta, Georgia. The conference was attended by twenty-one people from academic institutions with two-year or four-year programs in environmental health, from agencies that employ environmental health technicians and sanitarians, and by persons experienced or knowledgeable in training and curriculum development. This conference was held because of the manpower needs in the field of environmental health. There is an increasing utilization of and need for two-year trained environmental health technicians by governmental agencies concerned with environmental control, and by industry. The community colleges developing programs for training environmental technicians need curriculum guidelines. The prediction for future manpower needs, and programs to train people to meet these needs, make the development of curriculum guidelines even more critical.

The changing nature and the increasing intensity of problems in environmental control have made it impractical and impossible for professionals to cope adequately with both technical and professional duties. For example: job analyses indicate that many activities currently performed by the professional sanitarian could be performed by a person with less than baccalaureate level education and training. Thus, a partial solution to the manpower shortage is to train technicians who can handle a significant part of the technical aspects of the work currently being performed by professionals. The technician can be trained in approximately one-half the time at less expense than is required to prepare the entry-level professional. The technician cannot replace the professional, but can be trained to carry on the technical aspects of an environmental health

control program under the supervision of a professional. This allows the professional environmentalist more time to function in areas of planning, developing, administering, evaluating and promoting environmental control programs. The salary range for the technician, when compared with that of the professional, is also appealing to an employer. The overall purpose of the environmental health technician training program is to upgrade the expertise and general technical competency of people available for employment in environmental control programs.

Environmental health technician training can most appropriately be offered by community colleges or junior colleges. Such institutions conduct training programs extending up to two years duration, which may lead to the Associate of Arts degree, or the Associate of Applied Science degree, or to similar associate degrees. Many community colleges and junior colleges are committed to technical and vocational training and currently have many other types of technician training programs, including several in the health fields. They are geared to recruit people into two year training programs and have maximum contact with students desiring this type of training. The community colleges can utilize professionals employed in the surrounding regions to assist in the technical development and implementation of the technician training program and to supplement the faculty responsible for the training program.

The charge to the conference was:

1. Develop a definition for the environmental health technician.
2. Develop a guideline for a two year curriculum for environmental health technicians.
3. Develop a plan for dissemination of the curriculum guidelines.

At the onset of the conference, the participants agreed on three points and then devoted a major effort to the development of curriculum guidelines. The three points agreed upon were:

1. The acceptance of the description of the environmental Health technician as it appears in the Position-Classification Standards, U. S. Civil Service Commission, Environmental Health Technician Series, GS 689, October, 1969.

2. The environmental health technician should be trained as a generalist so that he can either work across the board in a general environmental control program, or function in a number of specialized areas or activities.

3. The environmental Health technician should be "job ready" when he completes his two year program of study, but he should not be dead-ended. That is, he should be able to transfer into a four year environmental health curriculum with maximum transferability of credit.

The following curriculum guidelines were developed, recognizing that each institution has its own peculiar or unique requirements and goals and is limited by its resources, facilities and faculty. Contemplating such variations, the guidelines are designed to emphasize those topic areas found to be most commonly essential to the development of the "job ready" generalist in environmental health technology.

TWO YEAR ENVIRONMENTAL HEALTH TECHNICIAN PROGRAM

CURRICULUM GUIDELINES

LIBERAL ARTS AND SCIENCE CONTENT

	Recommended Topics	Desirable Topics
COMMUNICATIONS:		
	English Composition	Report Writing
		Speech
SOCIAL SCIENCES:		
	Sociology	Economics
	Political Science Local and State government.	
	Psychology Interpersonal and group relationships.	
SCIENCES:		
	Algebra	Trigonometry and Geometry.
	Physical Science or Introduction to Physics	Ecology
	General Chemistry	
	General Biology	
	General Microbiology with laboratory	

TWO YEAR ENVIRONMENTAL HEALTH TECHNICIAN PROGRAM

CURRICULUM GUIDELINES

TECHNICAL CONTENT

Recommended Topics	Desirable Topics
Water Quality	Industrial Hygiene
Air Quality	Noise Control
Food Protection	Radiological Health
Vector Control	Land Use
Solid Wastes	Accident Prevention
Shelter	Plan Review

SURVEY COURSE--ENVIRONMENTAL HEALTH

A curriculum preparing the environmental health technician should include a course designed to cover all the recommended and desirable topics listed above. This course should be offered early in the curriculum to acquaint the student with the broad scope of the field of environmental control and how these topics relate in a comprehensive environmental health program. The course should be valuable to other students in the school because of the general interest in this basic subject area.

SURVEY COURSE--PUBLIC HEALTH OR COMMUNITY HEALTH

The student should be introduced to the broad field of public health or community health, of which environmental health is a part. The course should give definition and application of health education methodology and principles, epidemiology, communicable disease control, public health law, and public health organization and administration.

FIELD TRAINING

Field Training is an essential part of the training of a technician. The field involvement should be comprehensive and of sufficient duration to permit

the student actually to practice the skills to which he has been introduced through lectures, laboratory sessions, problem solving sessions, and field observations. Much of the field involvement should consist of performing activities that will be of value to the training agency and to the community.

CURRICULUM CONTENT

The liberal arts and the sciences in the curriculum should total approximately 40 percent of the two year program. The technical content of the curriculum should total approximately 40 percent of the two year program. The remaining 20 percent of the program should consist of elective courses or special college requirements. The development of a curriculum should be preceded by an analysis or survey of the employment opportunities and skill requirements of the environmental health technician within the region normally served by the institution. Such a study will identify areas of vocational competence which should be emphasized in the technical areas of the curriculum.

VARIATIONS IN CURRICULUM CONTENT

It is recognized that curricula will vary on the basis of regional needs and the organizational pattern of any particular educational institution. Variations are expected between the colleges in the courses offered, in the course titles, and in the actual course content. Each college would be expected to offer a majority of the recommended topics in a comprehensive manner. The remainder of the recommended topics, and the desirable topics, would be incorporated into the survey course in environmental health. A program which does not offer a majority of the recommended topics in a comprehensive manner could not be considered a generalized program.

TRANSFERABILITY OF CREDITS

The courses required and recommended for the two year curriculum should be of such content and level that a majority of the hours taken in the two year

curriculum would be transferable to a four year curriculum in environmental health or related field.

FACULTY QUALIFICATIONS

The instructors of the technical content of the curriculum should have the following minimum qualifications:

a. Three years experience within the general field of environmental health practice.

b. Have recognized professional standing.

c. Possess a B.S. in environmental health or related area of study.

The coordinator of the environmental health technician program should have the following qualifications:

a. Five years experience within the general field of environmental health practice.

b. Have recognized professional standing.

c. Possess a Master's degree which will enhance his competencies in environmental health or in teaching.

CURRENT AND CONTINUING NEEDS

1. There is a need for task analyses of the jobs to be filled by the environmental health technician. This information will assist in the development of specific content needed in environmental health technician training programs. The environmental health technician training programs should be continually reviewed to be certain that there is not "over educating" at the community college level. Seeking to maximize the transferability of credits may endanger the primary goal of realistic preparation of the "job ready" technician.

2. There is a need for occasional review of the curriculum guidelines presented in this report to see that they are looking ahead and preparing the type

and quality of environmental health technicians that are needed in the coming years.

3. There is a need for an effort to coordinate the federal programs and funding for specialized environmental technician training programs so that the various programs complement one another and are not contradictory or damaging to other programs.

4. The environmental health technician will find an increasing demand for his service outside the conventional public health organizational structure. There is a need for a forum of the related professions and the representative employer groups to outline the common goals and objectives which should guide future curriculum development for technician training.

DISTRIBUTION OF CONFERENCE REPORT

The results of this conference will be largely wasted unless the curriculum guidelines that have been developed and the accompanying recommendations are distributed to those persons, agencies, organizations, and institutions which can utilize them and put them into effect. We recommend that this report be circulated to the following:

Federal Agencies

Bureau of Health Professions, Education and Manpower Training, Division of Allied Health Manpower, N.I.H.

Federal Water Quality Administration*

Environmental Health Service*

Dept. of Health, Education and Welfare--Office of Personnel

Office of Education--Vocational Training

Department of Labor

State Agencies

Department of Education--All states

Department of Health#--All states

Office of Comprehensive Health Planning--All states

Professional Organizations

National Environmental Health Association, and each affiliate.

American Public Health Association

International Association of Milk, Food and Environmental Sanitarians--each affiliate.

National Society of Professional Sanitarians--and each affiliate

Conference of Local Environmental Health Administrators

American Intersociety Academy for Certification of Sanitarians

American Society for Engineering Education

Other Organizations

American Association of Junior Colleges

Association of Schools of Allied Health Professions

National Sanitation Foundation--POTEET (Programs of Training and Education in Environmental Technology)

*Succeeded by the Environmental Protection Agency

#Or newly established agencies for environmental control.

TWO YEAR CURRICULUM FOR ENVIRONMENTAL HEALTH TECHNICIANS

PARTICIPANTS

Atlanta, Georgia
May 27-28, 1970

V. Harry Adrounie	Environmental Consultant Reed Road Downington, R.D. 2, Pa. 19335
Ned E. Baker	Environmental Health Consultant Health Planning Assn. of N.W. Ohio 2243 Ashland Avenue Toledo, Ohio 43620
William A. Broadway	Regional Sanitarian Western Regional Office North Carolina State Board of Health Room 13, Biltmore Plaza Bldg. Asheville, N.C. 28803
Richard Clapp	Chief, Sanitarian Development Activities Health Professions Branch Center for Disease Control Atlanta, Georgia 30333
Fred N. Cooper	University of California Office of the Chancellor Davis, California 95616
Kenneth L. Copes	Asst. Professor of Health Box 1055, Eastern Kentucky University Richmond, Kentucky 40475
John R. Fleming, Co-Chairman	Asst. Professor, Environmental Health School of Health Sciences and Art Ferris State College Big Rapids, Michigan 49307
Jack B. Hatlen	Asst. Professor, Dept. of Environ. Health Administrative Officer, School of Public Health and Community Medicine University of Washington Seattle, Washington 98105
Dr. Wilbur Hoff	Institute for Health Research 2728 Durant Avenue Berkeley, California 94704
Richard S. Holdstock	Environmental Health & Safety Officer University of California Davis, California 95616

Herman Koren	Asst. Professor, Health & Safety Indiana State University Terre Haute, Indiana 47803
John J. McHugh	Assistant Director Office of Professional Education New York City Health Department 125 Worth Street New york, N.Y. 10013
Dr. Joseph McIntosh	Administrator, Special Services Division of Public Health Room 1721, City-County Building Indianapolis, Indiana 46204
Dr. Monroe T. Morgan Chairman	Professor, Dept. of Environmental Health East Tennessee State University Johnson City, Tennessee 37601
Edison E. Newman	Chief, Allied Health Training Section DAHM/BEMT/NIH 9000 Rockville Pike Bethesda, Maryland 20014
David F. Newman	Asst. Professor, Environmental Health Technology Department Broome Technical Community College Binghamton, N.Y. 13902
William B. Parsons	Assistant Manpower Director Parklawn Building, Room 18-81 5600 Fishers Lane Rockville, Maryland 20852
Nicholas Pohlit, Project Director	Executive Director National Environmental Health Association 1600 Pennsylvania Street Denver, Colorado 80203
John Reddington	National Sanitation Foundation Box 1468 Ann Arbor, Michigan 48106
Edith Reinisch	Coordinator of Health Related Professions Holyoke Community College Holyoke, Massachusetts 01040
Harry Steigman	Director, Bureau of Housing and Environmental Control Pennsylvania Department of Health Harrisburgh, Pennsylvania

UNITED STATES CIVIL SERVICE COMMISSION

POSITION - CLASSIFICATION STANDARDS

GS-698 ENVIRONMENTAL HEALTH TECHNICIAN SERIES GS-698

This series includes positions that involve investigating, evaluating, and providing information on sanitation practices, techniques, and methods for the purpose of identifying, preventing, and eliminating environmental health hazards. Positions in this occupation require a practical knowledge of basic environmental health concepts, principles, methods, and techniques, including survey and inspection techniques and control and eradication methods.

EXCLUSIONS

1. Positions that involve planning, developing, evaluating, and advising on programs concerned with the elimination and prevention of environmental health hazards. These positions are classified in the Sanitarian Series, GS-688.

2. Positions involving inspections or investigations for the primary purpose of enforcing compliance with public health laws and regulations pertaining to food, drug, cosmetics, or to the wholesomeness and purity of food and food products. Such positions are classified in the appropriate series of the Investigation Group, GS-1800.

3. Positions primarily involving grading foods or other commodities, or developing, installing, or administrating quality control programs. Such positions are classified in the appropriate series of the Commodity Quality Control, Inspection and Grading Group, GS-1900.

EXPLANATORY STATEMENT

Environmental Health aids and technicians provide technical support and assistance to the sanitarian or other health specialists (e.g., sanitary engineer, health physicist, health officer). They conduct surveys and implement measures to control the spread of diseases and other health hazards or conditions (e.g., food contamination, air and water pollutants, insect and rodent harborages). They take samples of such materials as water, food, and air, and perform or assist sanitarians in performing tests to determine contamination. They explain how to repair, install, or construct sanitation facilities (e.g., water systems, sewage disposal systems, plumbing), as well as how to maintain and utilize individual facilities. They investigate public and private establishments (e.g., food markets, restaurants, dairy plants, water supplies, medical care facilities) to determine compliance with or violation of public sanitation laws and regulations. However, when the primary purpose of the position is to perform the latter duty, it should be allocated to the appropriate series in the investigation group (e.g., Public Health Inspection Series, GS-1860; Food Inspection Series, GS-1863).

At the higher levels, many of the assignments made to technicians require the same depth of analysis as sanitarian positions. They differ from sanitarian assignments in that the technician is not required to resolve problems that require the application of new methods and techniques or those that require action beyond the specific work assignment. On the

other hand, the knowledges and abilities required for sanitarian work may be different in kind and breadth from those required for technician work, but not necessarily different in grade level. For example, technician work may require a high level of technical or administrative qualifications applicable to specific work assignments based on a comprehensive background of practical experience, training, and skill in applying knowledge of precedents, guides, and techniques.

While all positions require a practical knowledge of basic environmental health concepts, principles, methods, and techniques, the experienced technician must have a detailed knowledge of the laws and regulations governing environmental health practices as well as what constitutes a good environmental health program in one or more of the following, or other comparable environmental health areas:

-Milk and Food
-Water Supply
-Waste
-Insect and rodent
-Shellfish
-Recreation, housing, care facilities, or other institutions.

TITLES

The title for trainee or developmental jobs (GS-1/3) is Environmental Health Aid. Environmental health aids collect and record adequate data on existing environmental sanitation conditions and initiate corrective action on the health hazards that are fully covered by written guidelines.

The title Environmental Health Technician is established for all non-supervisory positions in this series (GS-4 and above). Illustrative examples of tasks performed by environmental health technicians include the following:

- Conduct investigations to determine the source of outbreaks of diseases (e.g., water supplies, contaminated food, untreated waste);
- Determine sources of, and methods to eliminate or control, insect and rodent breeding and harborage;
- Inspect and evaluate sanitary aspects of rail, sea, and air conveyances;
- Perform water quality tests on individual water supplies and disinfect community water sources and systems; and
- Prepare reports of findings and discuss recommendations with owners or representatives of public and private establishments to secure cooperation in improving sanitation practices.

Those positions which include supervisory responsibilities of such significance as to require supervisory qualifications will be identified by the adding of the prefix, Supervisory, to the basic title.

EVALUATION NOTES

This material does not include grade-level criteria. The following standards and guide may be used to evaluate environmental health aid and technician positions.

Positions concerned with investigative, survey, or testing activities will be evaluated by comparison with the criteria for related occupations such as:

The Biological Technician Series, GS-404, Section II,

The Medical Technician Series, GS-645, and

The Physical Science Technician Series, GS-1311.

Supervisory positions should be evaluated by reference to the Supervisory Grade-Evaluation Guide, Part I.

(TS 82)
October 1969

APPENDIX B

SURVEY CORRESPONDENCE

IOWA WESTERN COMMUNITY COLLEGE

ROBERT D. LOOFT, *Superintendent*

Administrative Offices
and
Council Bluffs Campus
2700 College Road
Council Bluffs, Iowa 51501
Telephone (712) 328-3831

Clarinda Campus
923 East Washington St.
Clarinda, Iowa 51632
Telephone (712) 542-5117

This College is conducting a research project to determine the job competency needs of a sanitarian aide. A study has revealed that further research is necessary in this area and the Iowa State Department of Public Instruction has asked Iowa Western Community College to conduct this research. It is felt that a competency needs study is required to strengthen the curriculum in environmental sanitation courses at the high school and community college level.

You have been selected as a participant in this study because of your position in the public health or environmental programs in your community. The attached survey instrument should not take more than fifteen minutes of your time. Won't you please help us?

The questions on the survey instrument relate to only four possible areas of the sanitarian aide's work. Additional questionnaires will be designed to cover other possible areas of a sanitarian aide's work assignments.

Your immediate response in the enclosed postage-free envelope is requested and gratefully acknowledged in advance.

Sincerely yours,

Harold Pengra
Project Director
IOWA WESTERN COMMUNITY COLLEGE

HP/llm

Enclosure

Sanitarian Aide Competency Needs Survey

IOWA WESTERN COMMUNITY COLLEGE
2700 College Road
Council Bluffs, Iowa 51501

For the purposes of this study, the term Sanitarian Aide is considered to be a person with less than a Bachelor's degree who works independently in the field at a para-professional level under the direct supervision of the professional.

Column A– In my opinion, it is highly necessary for the Sanitarian Aide to possess a high degree of proficiency in the skill or attribute listed.

Column B– In my opinion, it would be desirable for the Sanitarian Aide to possess some degree of proficiency in the skill or attribute listed.

Column C– In my opinion, the skill or attribute listed is not applicable to the duties and responsibilities performed by a Sanitarian Aide.

A. Highly Necessary
B. Desirable
C. Not Applicable

Check only one column for each skill or attribute listed.

		A	B	C
GENERAL ATTRIBUTES				
1	Knowledge of codes, laws, rules & regulations pertaining to work			
2	Ability with public relations and with public			
3	Ability to write meaningful and intelligent reports			
4	Good personal hygiene			
5	Dependable work habits			
6	Knowledge of the professional jargon of the discipline			
7	Understand methods of gathering and preserving evidence			
8	Knowledge of enforcement procedures			
9	Ability to be a court witness			
10	Ability to cooperate and work with other departments and agencies			
RESPONSIBLITIES PERTAINING TO PRIVATE WATER SUPPLIES				
11	Ability to calculate volumes of water required at an installation			
12	Ability to calculate peak load of a water system			
13	Ability to size systems to meet load requirements			
14	Ability to recognize need of disinfection			
15	Ability to run field test for disinfectant residual			
16	Ability to recognize different types of wells			
17	Ability to recognize cross connections			
18	Know the sanitary precautions for each type of well			
19	Know how to run a "yield and drawdown" test			
20	Know how to disinfect a water source and system			
21	Understand spring development as a domestic water source			
22	Ability to inspect and recognize each type of well construction			
23	Know the possible routes of contamination in each type of well			
24	Ability to sample water supplies			
25	Ability to interpret water supply analysis reports			
26	Know the procedure to seal an abandoned well			
27	Know the public health hazards of a contaminated system			

		A	B	C
RESPONSIBILITIES PERTAINING TO PRIVATE SEWAGE DISPOSAL SYSTEMS				
28	Know and have the ability to apply standards to privies			
29	Ability to accomplish percolation tests			
30	Know the relationship between soil types and effluent absorption			
31	Ability to read sanitary plot maps and simple blueprints			
32	Ability to design and size systems to fit existing conditions			
33	Ability to inspect existing systems			
34	Ability to recognize acceptable installation			
35	Know the basis of lagoon operation			
36	Ability to size lagoons to a given system			
37	Know lagoon safety requirements			
38	Know lagoon maintenance requirements			
39	Ability to recognize system failure			
40	Know the public health hazards of waste disposal system failure			
RESPONSIBILITIES PERTAINING TO NUISANCE COMPLAINTS				
41	Ability to recognize public health aspects of a nuisance			
42	Ability to assist pet owners in fly, rodent, and odor control			
43	Ability to differentiate between sanitary and unsanitary conditions			
44	Know areas of a community which excludes specific classes of animals by zoning			
45	Ability to recognize sex of animals and fowl			
46	Ability to estimate approximate age of fowl			
47	Know the procedures in processing citizen-initiated complaints			
48	Ability to recognize noxious weeds			
49	Know proper use of herbicides and pesticides in nuisance control			
50	Ability to recognize all stages of life cycles of disease vectors			
RESPONSIBILITIES PERTAINING TO EATING AND DRINKING ESTABLISHMENTS AND VENDING OPERATIONS				
51	Understand the S.N.F. standards relative to food service equipment			
52	Ability to run field tests on dishwashing machines and sanitizing solutions			
53	Ability to inspect eating and drinking establishments under applicable codes			
54	Ability to recognize cross connections in plumbing			
55	Ability to size kitchen ventilation systems			
56	Understand sanitization of multi-use utensils			
57	Recognize acceptable single service utensils			
58	Ability to evaluate location of vending machines			
59	Ability to evaluate cleanliness of vending machines			
60	Understand control of pests in food service establishments			
61	Recognize hazardous chemicals and know their uses			
62	Understand the control of pathogenic organisms in food service establishments			
63	Recognize acceptable refrigeration facilities			
64	Recognize safe and unsafe food handling procedures			
65	Recognize good personal hygiene			

IOWA WESTERN COMMUNITY COLLEGE

ROBERT D. LOOFT, Superintendent

Administrative Offices
and
Council Bluffs Campus
700 College Road
Council Bluffs, Iowa 51501
Telephone (712) 328-5831

Clarinda Campus
923 East Washington St.
Clarinda, Iowa 51632
Telephone (712) 542-5117

This College is continuing a research project to determine the job competency needs of a sanitarian aide. A study has revealed that further research is necessary in this area and the Iowa State Department of Public Instruction has asked Iowa Western Community College to conduct this research. It is felt that a competency needs study is required to strengthen the curriculum in environmental sanitation courses at the high school and community college level.

You have been selected as a participant in this study because of your position in the public health or environmental programs in your community. The attached survey instrument should not take more than twenty minutes of your time. Won't you please help us?

The questions on the survey instrument relate to only eight possible areas of the sanitarian aide's work. An additional questionnaire will be designed to cover other possible areas of a sanitarian aide's work assignments.

Your immediate response in the enclosed postage-free envelope is requested and gratefully acknowledged in advance.

Sincerely yours,

Harold Pengra

Harold Pengra
Project Director
IOWA WESTERN COMMUNITY COLLEGE

HP/mlo

Enclosure

Sanitarian Aide Competency Needs Survey
IOWA WESTERN COMMUNITY COLLEGE
2700 College Road
Council Bluffs, Iowa 51501

Phase II

For the purposes of this study, the term Sanitarian Aide is considered to be a person with less than a Bachelor's degree who works independently in the field at a para-professional level under the direct supervision of the professional.

Column A– In my opinion, it is highly necessary for the Sanitarian Aide to possess a high degree of proficiency in the skill or attribute listed.

Column B– In my opinion, it would be desirable for the Sanitarian Aide to possess some degree of proficiency in the skill or attribute listed.

Column C– In my opinion, the skill or attribute listed is not applicable to the duties and responsibilities performed by a Sanitarian Aide.

A. Highly Necessary
B. Desirable
C. Not Applicable

		A	B	C
	AIR POLLUTION			
66.	Be able to define air pollution.			
67.	Know the primary gaseous components in the atmosphere.			
68.	Know what the adiabatic lapse rate is.			
69.	Know what a temperature inversion is.			
70.	Know the effects of meteorology and topography on air pollution.			
71.	Name five major sources of air pollution.			
72.	Name the six pollutants specified in the Clean Air Act.			
73.	Know the local ambient air quality standards for each of the six pollutants.			
74.	Know three respiratory diseases that tend to be aggravated by air pollution.			
75.	Be able to name three air pollution control devices.			
76.	Be able to discuss the synergistic effect of particulate and sulfur dioxide.			
77.	Know the Ringelmann System of defining visible air pollutants.			
78.	Know the various means used to monitor air pollution.			
79.	Know several deleterious effects of air pollution other than health effects.			
80.	Understand the relationship between air pollutants and allergies.			
81	Understand Air Pollution warnings, alerts and emergencies.			
	SOLID WASTE CONTROL			
82.	Knowledge of Soils.			
83.	Ability to operate landfill equipment.			
84.	Knowledge of acceptable roads within the landfill.			
85.	Know how to control blow paper.			
86.	Understand the significance and control of leachate.			
87.	ow proper compaction and cover procedures.			
88.	Ability to evaluate compaction equipment.			
89.	Ability to calculate volumes of refuse and cover material.			
90.	Ability to route pickup crews.			
91.	Know maintenance procedures on equipment.			
92.	Estimate net weight on volume of loads.			
93.	Know sanitary landfill standards.			
94.	Knowledge of a Systems Analysis Concept.			
95.	Knowledge of Volume Reductions Systems.			
96.	Knowledge of vector control.			
97.	Knowledge of sanitation at a transfer station.			
98.	Know refuse control measure at camps and transient lodging facilities.			
99.	Understand community-wide solid waste control methods.			

		A	B	C
	INDUSTRIAL NOISE			
100.	Understand definition of noise as compared to sound.			
101.	Understand undesirable hearing changes as result of noise levels.			
102.	Ability to define decibels.			
103.	Ability to define frequencies in cycles per second.			
104.	Knowledge of pressure level of noise.			
105.	Knowledge of frequency of noise.			
106.	Know what an ondimeter is.			
107.	Knowledge of acoustical or sound-absorbing walls.			
108.	Knowledge of value of sound muffs.			
109.	Know principal sources of community noises.			
110.	Understand noise prevention methods.			
111.	Understand noise abatement methods.			
112.	Understand application of sound proofing buildings and offices.			
113.	Know acceptable standards of noise levels for homes and industry.			
114.	Know the level of decibels that causes some permanent hearing loss.			
	WATER POLLUTION CONTROL			
115.	Know the potential ways for increasing the usable water supply.			
116.	Ability to take legal water samples.			
117.	Know the functions of a reservior.			
118.	Know how to study the flood characteristics of a stream.			
119.	Knowledge of techniques used to treat water.			
120.	Knowledge of the Floatation Process.			
121.	Knowledge of the Continuous Regeneration Process.			
122.	Knowledge of removing flourides from water.			
123.	Ability to do a sanitary survey of water supply.			
124.	Knowledge of the types of chemicals used for emergency chlorination.			
125.	Ability to define "potable water."			
126.	Knowledge of the Zone of Aeration.			
127.	Understand quality control methods in water treatment plants.			
128.	Ability to sample chlorinated water.			
129.	Knowledge of State Urban Water Supply and Sewerage Systems Act.			
	TRANSIENT LODGING INSPECTION			
130.	Understand and apply standards for semi-public water and sewage systems.			
131.	Understand standards of floor space and cubic air space for occupancy.			
132.	Ability to apply sanitary standards to migratory labor camps.			
133.	Recognize health hazards at summer camps.			
134.	Know how to calculate the volume of water required per person.			
135.	Understand vector control in camps.			
136.	Understand electrical, sewage, and water hookups in public camp sites.			
137.	Ability to recognize adequate laundry facilities in migrant labor camps.			
138.	Recognize cross connections between water and sewage systems.			
139.	Know ratio of plumbing-fixtures-to-population of day camps.			
140.	Know space requirements for outdoor campsites.			
141.	Understand fire regulations and standards.			
142.	Understand and be able to explain use of pesticides in camps.			
143.	Ability to recognize fire safety hazards in motels and hotels.			
144.	Recognize type and application of fire extinguishers.			

	A	B	C
COMMUNICABLE DISEASE CONTROL			
145. Know the reservoir of communicable disease endemic to the area.			
146. Know the mode of transmission of vector-borne diseases.			
147. Understand definitions of epidemic, endemic, pandemic, sylvan and urban.			
148. Understand the relationship between wild animal population and rabies.			
149. Understand dog and cat control ordinances used in human rabies cases.			
150. Understand the transmission of zoonosies.			
151. Understand reproduction and physiology of bacteria.			
152. Understand the difference between aerobic and anaerobic bacteria.			
153. Understand pasteurization, sanitation, and sterilization.			
154. Knowledge of the Flourescent Antibody Test.			
155. Knowledge of active and passive immunity.			
156. Know the general effects of light on bacteria.			
157. Knowledge of intestinal nematodes.			
158. Knowledge of Cestodes and Trematodes.			
159. Know the term "Thermal Death Time."			

SWIMMING POOL INSPECTION			
160. Know the meaning of "High-free Residual Chlorine."			
161. Ability to read and evaluate a flow diagram.			
162. Know cause of mud ball in filters.			
163. Ability to take legal swimming pool water samples.			
164. Understand algae control.			
165. Understand relationship of pH to chlorine.			
166. Know recommended depth of diving area to height of diving board.			
167. Know diseases usually associated with natural bathing places.			
168. Understand bacterial standards and their application.			
169. Understand recirulation systems.			
170. Ability to interpret analysis results.			
171. Ability to run field tests for chlorine and pH.			
172. Know requirements of safety equipment.			
173. Understand use of chlorine, alum and soda ash.			
174. Be able to calculate and maneuver bathing load.			

MILK INSPECTION			
175. Know how to check a leak protector valve.			
176. Know how to operate a HTST flow diversion valve.			
177. Ability to check time and temperature on both HTST and Batch Pasterurizers.			
178. Know bacterial and chemical standards for both raw and pasteurized milk.			
179. Understand use of vacuum chamber in odor and taste control.			
180. Know how to calculate logarithmic average of bacterial counts.			
181. Ability to take legal milk samples.			
182. Understand application of the "holding tube."			
183. Know the differential in pressure of raw and pasteurized milk in HTST units.			
184. Understand mastitis control.			
185. Undstand relationship of cow herd health and human disease transmission.			
186. Know the significance of Coliform bacteria in pasteurized milk.			
187. Know the significance of phosphatase in pasteurized milk.			
188. Know farm storage milk temperature requirements.			
189. Know required contact times and strengths of various disinfectants.			

IOWA WESTERN COMMUNITY COLLEGE

ROBERT D. LOOFT, *Superintendent*

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You have been selected as a participant in this study because of your position in the public health or environmental programs in your community. The attached survey instrument should not take more than twenty minutes of your time. Won't you please help us?

The questions on this survey instrument relate to only eight possible areas of the sanitarian aide's work. This is the final questionnaire of this project.

Your patience, cooperation, and assistance has been invaluable and I gratefully express my thanks to you.

Your immediate response in the enclosed postage-free envelope is requested.

Sincerely yours,

Harold Pengra
Project Investigator
Iowa Western Community College

Sanitarian Aides Competency Needs Survey
IOWA WESTERN COMMUNITY COLLEGE
2700 College Road
Council Bluffs, Iowa 51501

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Column C– In my opinion, the skill or attribute listed is not applicable to the duties and responsibilities performed by a Sanitarian Aide.

A. Highly Necessary
B. Desirable
C. Not Applicable

HOUSING INSPECTION	A	B	C
190. Ability to recognize acceptable kitchen facilities.			
191. Ability to recognize acceptable toilet facilities.			
192. Ability to recognize acceptable sleeping facilities.			
193. Ability to recognize acceptable bathing facilities.			
194. Understand the definitions in the State Housing Code.			
195. Know the responsibilites of owners of dwelling.			
196. Know the responsibilites of occupants of dwelling.			
197. Ability to recognize adequate heating facilities.			
198. Know plumbing fixtures required in dwellings.			
199. Know regulations relative to handrails on steps.			
200. Know meaning of deteriorated and delapidated.			
201. Know window and skylite and/or artifical light required.			
202. Know toxic paint and toxic preservative materials.			
203. Know rat proofing methods.			
204. Know density and space requirements.			

RODENT CONTROL	A	B	C
205. Know accepted safe guards for various poisons.			
206. Ability to recognize Norway Rat & Roof Rat.			
207. Know effective rat proofing methods.			
208. Know diseases spread by rodents to man.			
209. Know house mouse control methods.			
210. Ability to recognize rodent harborages.			
211. Know standards for storing materials to deter rodents.			
212. Ability to recognize restricted substances by name.			
213. Ability to estimate size of rodent population.			
214. Know tracking powders and how to use them.			
215. Know how various diseases are transmitted from rodents to man.			
216. Ability to estimate age of rodent signs.			
217. Know how to mix rodent baits.			
218. Know necessity of rat watering points.			
219. Understand fumigant methods.			

OCCUPATIONAL SAFETY INSPECTION	A	B	C
220. Know where IOSHA Laws apply and where local department has responsibility.			
221. Know what decible range hearing loss starts.			
222. Know the definition of noise.			
223. Understand occupational causes of hearing loss.			
224. Know relationship between duration of noise exposure & decible level.			
225. Knows where protective clothing must be worn.			
226. Knows when safety equipment must be readly available.			
227. Understands relationship between accident rate and housekeeping.			
228. Know "adequate toilet facilities" for number of employees.			
229. Know where eating and smoking areas are located in a plant.			
230. Know what "threshold limit values" are for toxic chemicals.			
231. Understand metric system of measurements.			
232. Know significance of oral, dermal, and inhalation exposure.			
233. Know what protective clothing is required in dusty conditions.			
234. Know how to run field tests for atmospheric contamination.			

RADIOLOGICAL INSPECTION	A	B	C
235. Understand radiation exposure.			
236. Ability to use dosimeter and gieger counter.			
237. Understand isotopic forms of elements.			
238. Know the significance of alpha, beta, and gamma exposure.			
239. Understand hazards of continuous x-ray exposure.			
240. Know acceptable disposal sites.			
241. Know who is responsible for disposal of radio-active waste.			
242. Know effect of radiation on living tissue.			
243. Have ability to monitor radiation from x-ray machine.			
244. Know fission from fusion.			
245. Ability to cooperate with Civil Defense Department in catastrophe.			
246. Understand the term: Electron, Proton, Neutron.			
247. Understand "half life" of an isotope.			
248. Know what to do in case of a radio active spill.			
249. Understand use of protective clothing & devices.			

INDUSTRIAL SANITATION	A	B	C
250. Ability to run carbon monoxide field test.			
251. Ability to recognize dangerous situations in industrial plants.			
252. Know good housekeeping practices.			
253. Understand occupational diseases caused by harmful situations.			
254. Understand physiological distress due to agents in industrial atmosphere.			
255. Understand abnormal stress due to improper work methods.			
256. Ability to work with plant safety officer.			
257. Recognize agents causing disabilities.			
258. Recognize conditions causing disabilities and accidents.			
259. Know what safety devices are needed in a given situation.			
260. Know which agents may cause respiratory disease.			
261. Know which agents may effect the skin.			
262. Know which State Department is responibile in case of an industrial accident.			
263. Ability to evaluate an industrial hygiene problem.			
264. Have completed Red Cross First Aid Training.			

INSECT CONTROL	A	B	C
265. Understand use of keys in insect identification.			
266. Know major disease spread to man by insect.			
267. Know insects of public health importance.			
268. Know life cycles of insects of public health importance.			
269. Know proper use of insecticides.			
270. Know how to calculate ppm and mix insecticides.			
271. Understand vector borne disease transmission.			
272. Know intermediate hosts of insects of public health importance.			
273. Know materials in which flies will lay eggs.			
274. Know sanitary storage methods of insect breeding materials.			
275. Know mosquito control methods.			
276. Ability to recognize mosquito breeding areas.			
277. Understand water ponding control as a mosquito control tool.			
278. Know the flight range of various mosquitos.			
279. Know naturalistic mosquito abatement methods.			

ANIMAL CONTROL	A	B	C
280. Know zoonosis indigenous to wild life of your area.			
281. Know wild host animal of zoonosis in your area.			
282. Know legal procedure to enforce local animal control code.			
283. Know proper procedures in a human rabies exposure.			
284. Know local requirements for restrictions of numbers of animals.			
285. Know evidence of lack of sanitary manure storage.			
286. Understand acceptable animal feed storage.			
287. Ability to cooperate with Humane Society.			
288. Know sanitary requirements for stockyards.			
289. Know how to handle a rabid animal.			
290. Know T. B. and Brucellosis Control methods in dairy cattle.			
291. Know Psittacosis control procedures.			
292. Know epidemiological procedures for zoonoses.			
293. Know how to get samples in safe, legal manner.			
294. Know modes of transmission for salmonella from pets to human.			

INSTITUTIONAL INSPECTION	A	B	C
295. Know the route of infection transmission in nursing homes.			
296. Ability to recognize unclean conditions by sight and smell.			
297. Know illumination standards for institutional kitchens.			
298. Know water volumn per bed and temperature standards for nursing home.			
299. Know proper use of pesticides in all types of institutions.			
300. Know and apply occupancy standards to all types of institutions.			
301. Know methods of disinfecting operating rooms.			
302. Know acceptable methods of cleaning & disinfecting different kinds of floors.			
303. Understand proper location of air intake and exhaust systems.			
304. Know proper handling methods of soiled mops.			
305. Know when air gaps are required on plumbing fixtures.			
306. Know sanitary methods of disposal of dressings and laboratory cultures.			
307. Know cleaning methods of refuse shoots & dumb waiters.			
308. Know difference in requirements of cross infection control in nursing homes and hospitals.			
309. Understand soiled Laundry handling problems in institutions.			